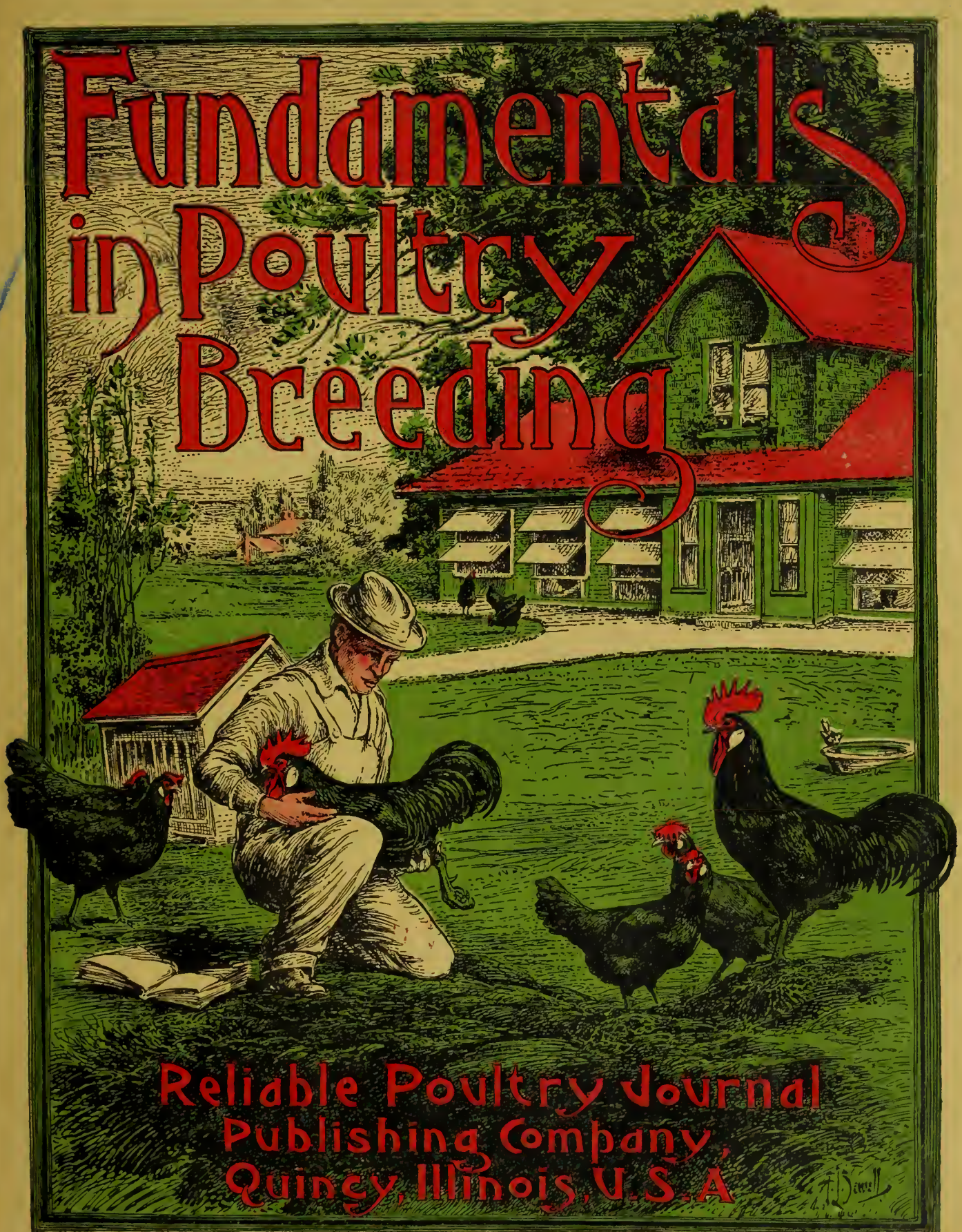
Fundamentals in Poultry Breeding



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STANDARD-BRED SINGLE COMB RHODE ISLAND REDS

From a painting by Franklane L. Sewell

As a local type the Rhode Island Red is oldest of the popular American breeds; as a Standard breed it is youngest. Admitted to the Standard in 1905, its subsequent improvement is a monument to the practical value of standards and the skill of breeders. The Rose Comb variety is like the Single in all but shape of comb.

FUNDAMENTALS IN POULTRY BREEDING

A Complete Guide to the Successful Breeding of American Standard Fowls, Turkeys, Ducks and Geese for Table Poultry, for Egg Production and for Exhibition

By
JOHN H. ROBINSON

Illustrated by
FRANKLANE L. SEWELL
Arthur O. Schilling Contributing

PRICE TWO DOLLARS

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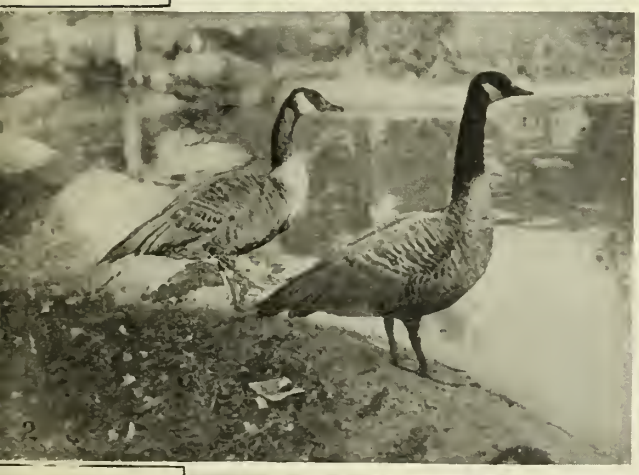
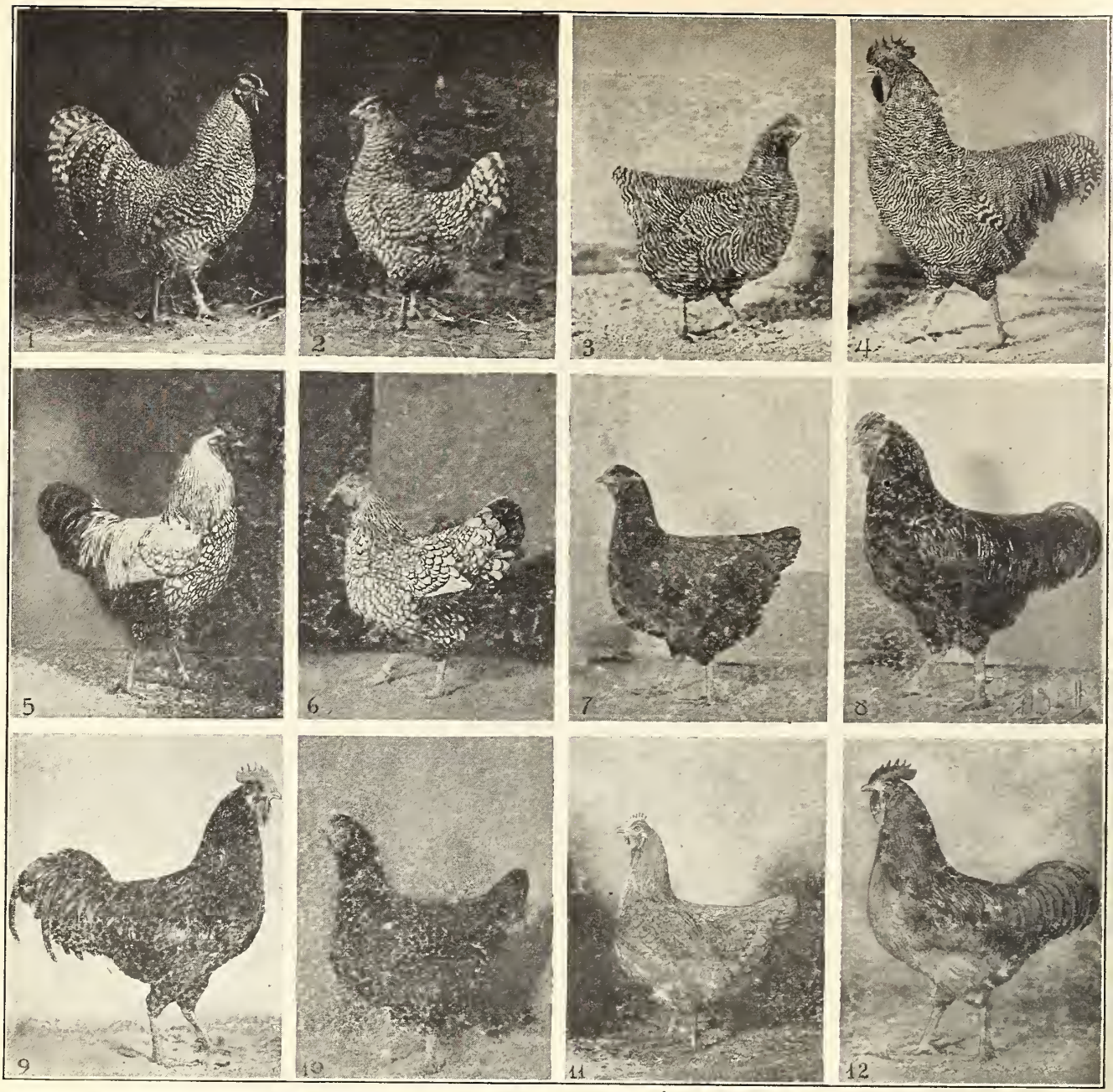


SPECIES OF POULTRY NATIVE TO AMERICA

1—The Wild Turkey, found by early explorers and colonists as far north as New England and as far south as Peru, but attaining its finest development in North America, and still living in the wild state in a number of localities there. 2—The American Wild Goose, also called the Canada Goose. It ranges the entire North American continent, but summers and breeds mostly in Canada, hence the name sometimes given it. When pinioned to prevent flying, wild geese breed and thrive in domestication and interbreed with domestic races. 3—The Muscovy Duck, a native of South America, not found wild elsewhere; domestic stocks are thoroughly domesticated. 4 and 5—Wild Mallard drake and duck. The wild Mallard is found all over the world and has undoubtedly furnished the foundation stock for all domestic races but the Muscovy.



ORIGINAL VARIETIES OF BREEDS "MADE IN AMERICA"

1, 2—American Dominique
3, 4—Barred Plymouth Rock
5, 6—Silver Laced Wyandotte
7, 8—Rhode Island Red
9, 10—Black Java
11, 12—Bucks County Fowl

The group above shows male and female of the first distinct variety in each American breed of historical importance. Many other breeds have been made and had for a while some standing and expectation of popularity. Of those shown here, only the Plymouth Rock, Wyandotte and Rhode Island Red are now of importance. In the Plymouth Rock five other standard color varieties have been made, in the Wyandotte, nine, and in the Java one. Rhode Island Reds are customarily described as of two varieties, rose comb and single comb; but strictly speaking, the breed is of one color variety with single and rose comb subvarieties.

Neither the Dominique or the Bucks County Fowl ever had distinct breed character and type as these characters are found in good Standard Plymouth Rocks, Wyandottes and Rhode Island Reds today. As to the Dominiques there is no good evidence of their existence with the modern Standard type, or any common type until after the Plymouth Rocks appeared. Earlier references to Dominiques simply mean fowls of that color not having other characteristics of some well-known breed. Such "Dominiques" were quite common in unimproved and mixed stocks in old times. The modern Standard type has never been popular, though well deserving a place among favorite breeds, because those undertaking to promote its interest have been more concerned about preserving ancient features than breeding in conformity with modern ideas.

The Bucks County Fowl while never widely known probably had a separate history covering a longer period than any of the others. Authentic statements identify them as a recognized breed as far back as 1800, and it was not until after 1900 that existing stocks of Bucks County Fowls were merged with the Buff Plymouth Rocks.

The fowls called Black Javas here in the middle of the last century were of various types. Any medium to large black fowl not having pronounced characteristics of some other easily recognized breed type was called a Java. The modern Black Java is a relic of the period when Barred Plymouth Rocks produced many black specimens.

The Standard type is a valuable one and one of the sort that could be given great popularity if bred consistently and vigorously promoted.

The Silver Wyandotte is one of the enigmas in the history of the making of breeds. Nothing is positively known of its origin. Numerous breeders both of this variety and of the Golden Laced which appeared soon after it claimed to be originators, but none was ever able to establish his claim to the satisfaction of critical students of the subject. In all cases there is reason to believe that the persons claiming to have produced birds with this character of marking and type obtained the stock from sources unknown sometime after it had passed the initial stages of development. The type probably originated independently in two or more widely separated places about the same time. As America was then a "melting pot" for breeds from all over the earth, that could easily happen.

The early history of the Plymouth Rock and Rhode Island Red is also deficient in many particulars, yet in these breeds we can get more specific information relating to the progenitors of the stocks that were first introduced to the public.

INTRODUCTION

THE breeding of poultry to high standards of productiveness and beauty is one of the most fascinating pursuits in which people of creative instincts and cultivated taste can engage. It is also the line of such work open to the greatest number of people.

In the nature of the case the work of systematic improvement of nearly all our domestic animals and a few of the larger kinds of domestic birds can be done only on farms, by persons who can give their time largely to such work, and who are able to invest considerable capital in it. Poultry breeding also has its inducements for this class of breeders, but in addition, its opportunities are open, on a scale proportionate to the land available and the leisure time that can be employed in it, to everyone who has land room to grow a few birds—if only bantams—every year.

From the commercial point of view breeding on this minimum scale is of no consequence. From every other point of view the opportunities of the poultry breeder on a small town lot compare favorably with the opportunities of the average farmer for breeding sheep or swine, and are better than his opportunities for breeding cattle or horses. With space beyond the minimum requirements for growing a little standard poultry the opportunities of the breeder expand in ever increasing ratio. It is possible for a person with room to grow not more than two score chickens a year to breed birds capable of winning in the strongest competition. There are breeders who have never grown more than seventy or eighty chickens in a season who have for years stood in the front rank of exhibitors of their variety. To do these things requires skill in growing birds as well as in breeding them, but breeding comes first in order and calls for the greater skill. The actual breeding experience of a poultry breeder working on this small scale for ten to fifteen years may easily be greater than a breeder of cattle or horses acquires in a lifetime.

When we come to those who produce many hundreds, or some thousands, of high-class standard birds annually we find a group having an understanding and mastery of the art and science of breeding to fixed types and to refined quality in every detail not equaled by the breeders of any other kind of domestic animals or plants. Their natural capacity for the work is doubtless no greater than that of breeders in other lines, but they have the opportunity to make many more combinations of superior specimens, and to study the results of much greater numbers of experimental as well as of regular matings. We have many poultry breeders of twenty to forty years' experience who in that time have produced and closely observed from ten thousand to a hundred thousand specimens.

Our poultry breeders, large and small, have, as a rule, been always ready to tell how they got their results. Probably the only apparent exceptions have been the cases where a breeder who had succeeded in producing something in advance of his competitors regarded it to his interest to keep the "secret" from them as long as possible—knowing that as they saw his birds from year to year they would soon discover it for themselves. In some of the most interesting of such cases the author has found the supposed secret published without attracting any attention among those who could profit by it long before the discovery which brought it into permanent use.

One of the greatest fallacies entertained by those not versed in matters relating to breeding is the idea that expert breeders have an interest in keeping their methods from the public. The only ground for that suspicion is the fact that, until the poultry public generally had an understanding of breeding that removed their prejudice against inbreeding, it was not good business policy for breeders of high-class stock to let it be generally known how closely their lines were bred. With better general understanding on this point, expert breeders not only have no interest in keeping anything about their methods to themselves, but it is to their advantage that those who buy their stock should know how to breed it right.

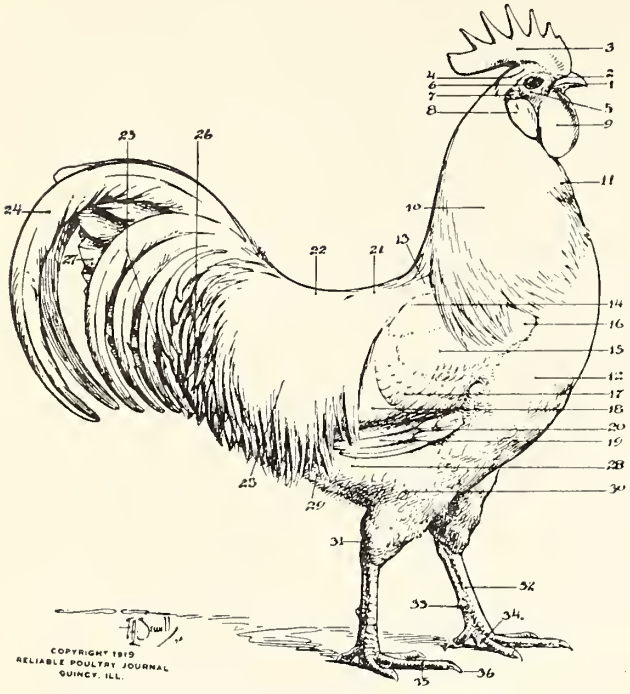
The expert breeder's one advantage over all others in using stock of his own breeding is the accurate knowledge of the ancestry of each bird through many generations. This knowledge in its entirety is exclusively his own. He cannot communicate it to others except in abbreviated and incomplete form, no matter how ready he might be to do so. It is the part of knowledge of the subject which each must get for himself. With this advantage in knowledge of the stock he has also the opportunity to retain his best specimens for his own breeding, and so, once he has established a lead he is able to hold it against any ordinary competition, as long as he can stand the physical and mental strain incident to such a position of preeminence.

In this book the author has undertaken to bring together in convenient form the essential knowledge of breeding which represents the experience of good breeders, past and present, and is the foundation of the results that have given American breeds of fowls, and American types of breeds of foreign origin, a standing in the world not attained by American types or breeds of any other class of live stock. With the exception of a few breeds of limited popularity here our standard American poultry is all either "made in America," or bred from a very few early importations. Nowhere among American poultrymen do we find the constant recourse to foreign lands for new blood of popular breeds which is seen in prominent breeds of cattle and horses. On the contrary, the American breeds of poultry have gained a strong footing in every foreign land where there is interest in improved poultry.

The beginner in poultry breeding here today is heir not only to the accumulated knowledge of the breeders before him, here and elsewhere, but to as much of the prestige of American poultry as he can claim by right of his accomplishments in breeding.

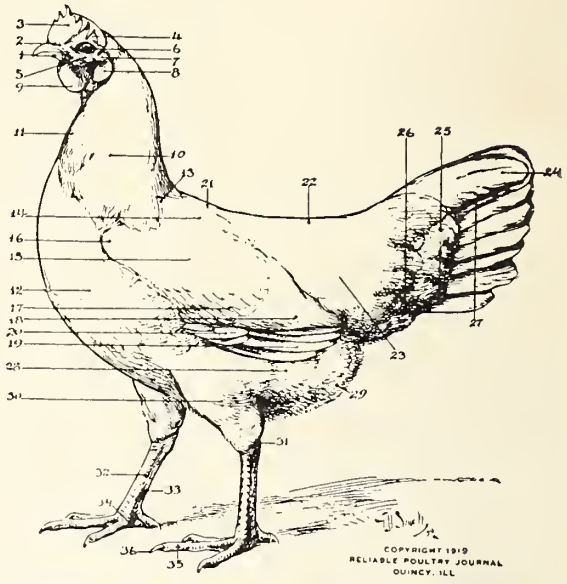
Nomenclature of Fowls

Nomenclature of Other Forms of Comb and of Other Ornamental Head Parts May Be Learned By Referring to Illustrations and Descriptions on Pages 26 and 27.



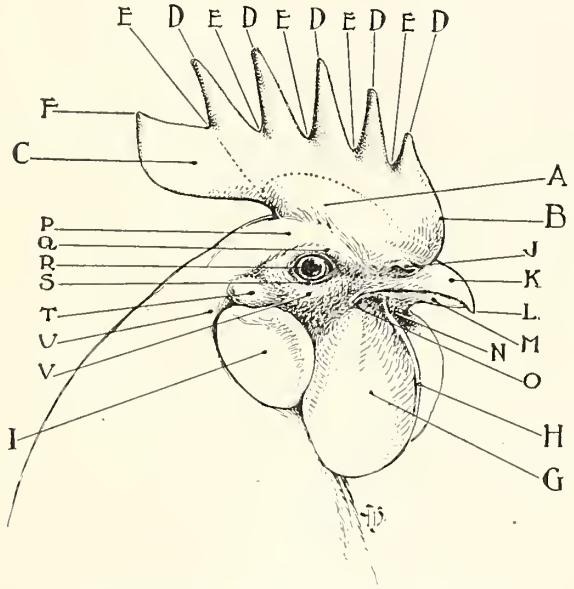
1—SECTIONS OF FOWL—MALE, SINGLE COMB

1—beak; 2—nostril; 3—comb; 4—crown of head; 5—face; 6—eye; 7—ear; 8—ear lobe; 9—wattle; 10—hackle (neck); 11—front of hackle; 12—breast; 13—cape; 14—shoulder; 15—wing bow; 16—wing front; 17—wing coverts, wing bar; 18—secondaries, wing bay; 19—primaries, flights; 20—primary coverts; 21—back; 22—saddle; 23—saddle feathers; 24—sickles; 25—smaller sickles; 26—tail coverts; 27—main tail feathers; 28—body feathers; 29—fluff; 30—thigh; 31—hock; 32—shank; 33—spur; 34—ball of foot; 35—toe; 36—toenail.



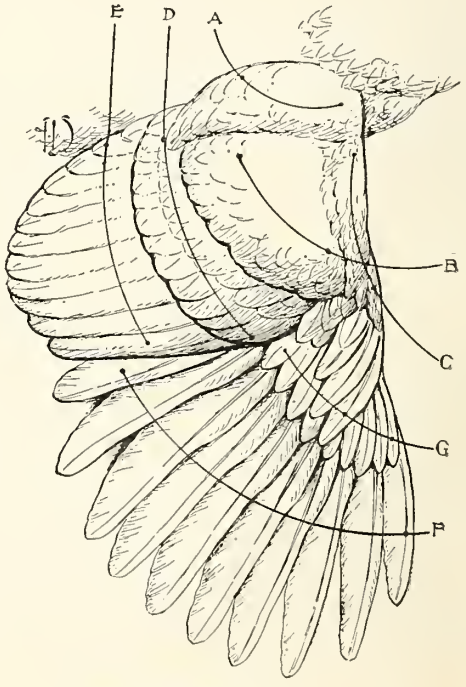
2—SECTIONS OF FOWL—FEMALE, SINGLE COMB

1—beak; 2—nostril; 3—comb; 4—crown of head; 5—face; 6—eye; 7—ear; 8—ear lobe; 9—wattle; 10—neck feathers; 11—front of neck; 12—breast; 13—cape; 14—shoulder; 15—wing bow; 16—wing front; 17—wing coverts, wing bar; 18—secondaries, wing bay; 19—primaries, flights; 20—primary coverts; 21—back; 22—sweep of back; 23—cushion; 24—top covert; 25—larger tail coverts; 26—smaller tail coverts; 27—main tail feathers; 28—body feathers; 29—fluff; 30—thigh; 31—hock; 32—shank; 33—spur; 34—ball of foot; 35—toe; 36—toenail.



3—DETAIL SECTIONS HEAD OF MALE

A—base of comb; B—comb; C—blade of comb; D—points of comb; E—serrations between points; F—point of blade; G—wattle; H—edge of wattle; I—ear lobe; J—nostril; K—upper mandible of beak; L—point of beak; M—lower mandible; N—throat; O—corner of mouth; P—crown of head; Q—brow; R—eye; S—eyelid; T—deaf ear; U—neck; V—face.



4—DETAIL SECTIONS OF WING

A—shoulder; B—wing bow; C—wing front; D—coverts, or wing bar; E—secondaries, or wing bay; F—primaries or flights; G—flight coverts.

CHAPTER I

Qualities of Breeds and Qualifications of Breeders

Misleading Ideas of Breed Character Arise From Faulty Common Definitions—How Breeds Are Made, Maintained and Improved—Skill in Practical Poultry Husbandry a Prime Factor in Successful Breeding—The Breeder Must Also Be Something Of An Artist and Scientist—Technical Definition of a Breed.

THE term "breed" is one of those words so familiar in common use that writers on the subject of breeding have generally assumed that every reader would know what a breed is without a technical definition. This neglect to give a necessary bit of information is no doubt responsible for the wide misunderstanding of the term among novices in poultry breeding.

The definitions of the word in our standard dictionaries may be sufficient for those who take no interest in the processes of breeding, but to those who wish to understand the subject or to make themselves proficient in the art of breeding improved stock they are sadly misleading. Take the two following definitions from two of the popular dictionaries:

"**Breed.** A race or variety of men or other animals (or plants) perpetuating its special or distinctive characteristics by inheritance."—Webster's Dictionary.

"**Breed.** The progeny of one stock—specifically, a race or strain, especially of domestic animals, that maintain characteristics artificially acquired."—Standard Dictionary.

In both of these definitions, as in the popular view which they express and which the authority of the dictionaries tends to emphasize and increase, the point emphasized is that the distinguishing character of a breed is inherent tendency and capacity to perpetuate its peculiarities. The fact is that in proportion to the thoroughness of breeding, breeds have a tendency to reproduce their type, but that their capacity to do this without the intelligent control of reproduction by the breeder is limited and short lived. So while well-bred stock of any established breed will maintain its type passably well for several generations under indifferent breeding, deterioration from the type begins from the time intelligent control of reproduction is relaxed, and after it has reached a point where even a novice observes it, the process of restoration is so tedious that it is generally better to discard the stock and begin anew with stock that has been kept up to the standard.

The fundamental reason for such departure from an established type is found in the natural law of variation. Our artificial standards for poultry are unnatural, not in requiring (as some suppose) things contrary to nature, but in being fixed, and in seeking to make all individuals of a race exactly alike. Nor is it true to say of any development that a breeder of domestic animals or birds makes characteristic of a breed, that it is contrary to nature. We cannot do things in this line that are contrary to nature. The most that we can do is to preserve and improve the variations which please us, instead of leaving the evolutions of type to the chances of life amid wild surroundings or of random matings in domestic flocks. Nature produces endless variation. No one looking at the extreme developments of various characters seen in some wild birds can reasonably maintain that any extreme development of a character seen in domestic birds could not possibly have occurred in nature. So it is well for us in beginning the study of breeds and breeding to accept the breeds as they are as the material for such a study, and not to take the attitude of considering as superficial the consideration of the characters which may seem to us unessential or abnormal.

How Breeds Are Made, Maintained and Improved

Breeds have been made in two ways: (1) By selecting from flocks of "common" poultry, having no common excellence or uniformity of any character, those specimens having the same attractive quality—as, larger size, more attractive shape and carriage, or a more pleasing color than the rest of the flock. (2) By the combination (crossing) of breeds already established to make an intermediate type, or one in which characters come in a new combination. A detailed study of the history of breeds of poultry will show some divergences from these general methods, but on the whole the making of a breed has followed either one line or the other.

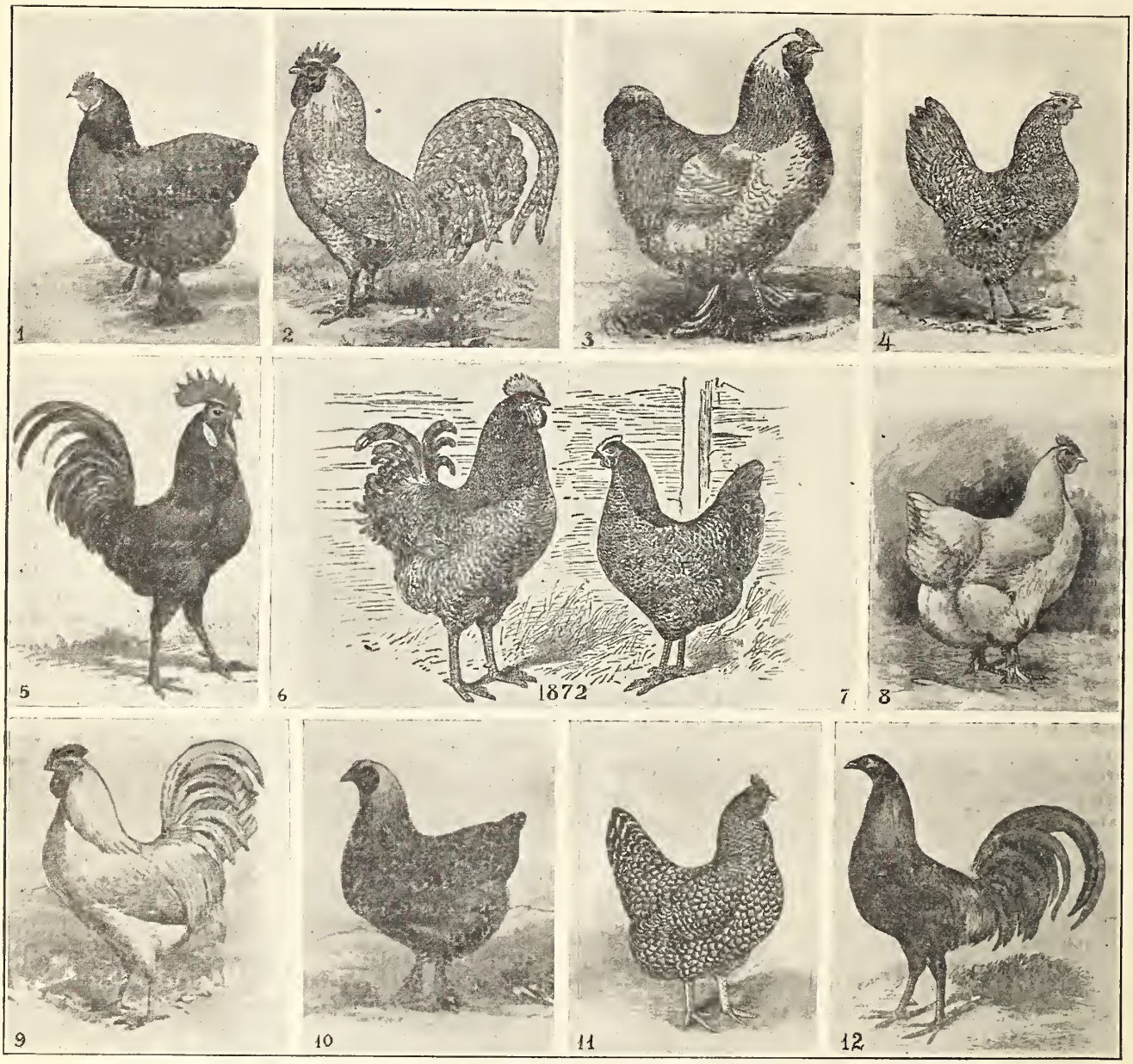
In the early history of a breed the character or combination of characters which the breeder is trying to fix is usually produced in only a very small percentage of the best matings that can be made. The first mating selected from ordinary stock is usually of birds of unknown pedigree, but presumably closely related—for if they were not they would not be likely under the circumstances to show marked resemblances. However that may be, their ancestry on both sides is usually much mixed, and their progeny may include specimens not much like either parent, but resembling various unlike ancestors. Even where some resemblance to the character of the parents which it is desired to establish exists, the quality of the character may be so inferior that the individuals having it are not desirable for breeding, and the breeder may continue through several seasons producing birds from the original mating in hope that eventually some of the quality desired may be obtained, or making other matings that he thinks may possibly give results of better quality—though one or both parents seem inferior to those he tried first. As will appear when we consider the behavior of characters in inheritance, the influence of a grandparent or great-grandparent sometimes exceeds that of a parent.

When the mating is a male and female of different established breeds the first generation may be quite uniform in general appearance, or in certain characters, but when bred together give progeny nearly as variable as those from mongrel stock. In either case—whether selecting from common stock or from the results of crossing—the breeder who persists in efforts to get a new breed keeps on mating experimentally, using mostly the specimens that come nearest to the type he has in mind until he gets a line that regularly produces some specimens of both sexes having a fair measure of quality in the combination of characters he is making.

Now he is fairly started, but a large proportion of his chicks each year will continue to come pronouncedly off-type, or of such inferior quality that they are worthless for breeding purposes. And his progress so far is only in establishing in a part of the race, and in crude form,

the distinctive characters of his new creation. As a rule, these distinctive characters are few in number. But as he must at the same time maintain a fair quality in all common characters, the question of selection for breeding is quite complex. Many generations of careful selection and judicious mating to eliminate undesired ancestral characters are required to bring a new breed to the stage where ancestral faults do not have to be very carefully watched.

By such a course of slow and painstaking selection every breed and variety of well-established distinctive character that we have was produced. At the present time the great majority of standard breeds are so well bred that even the inferior birds among them produce no offspring which is not readily identified as of the breed to which by blood and breeding it belongs. But with this progress in making breeds the standards for quality in every character have been steadily raised until breeds which at first were in every respect crude are now beautifully symmetrical and highly finished in every section.

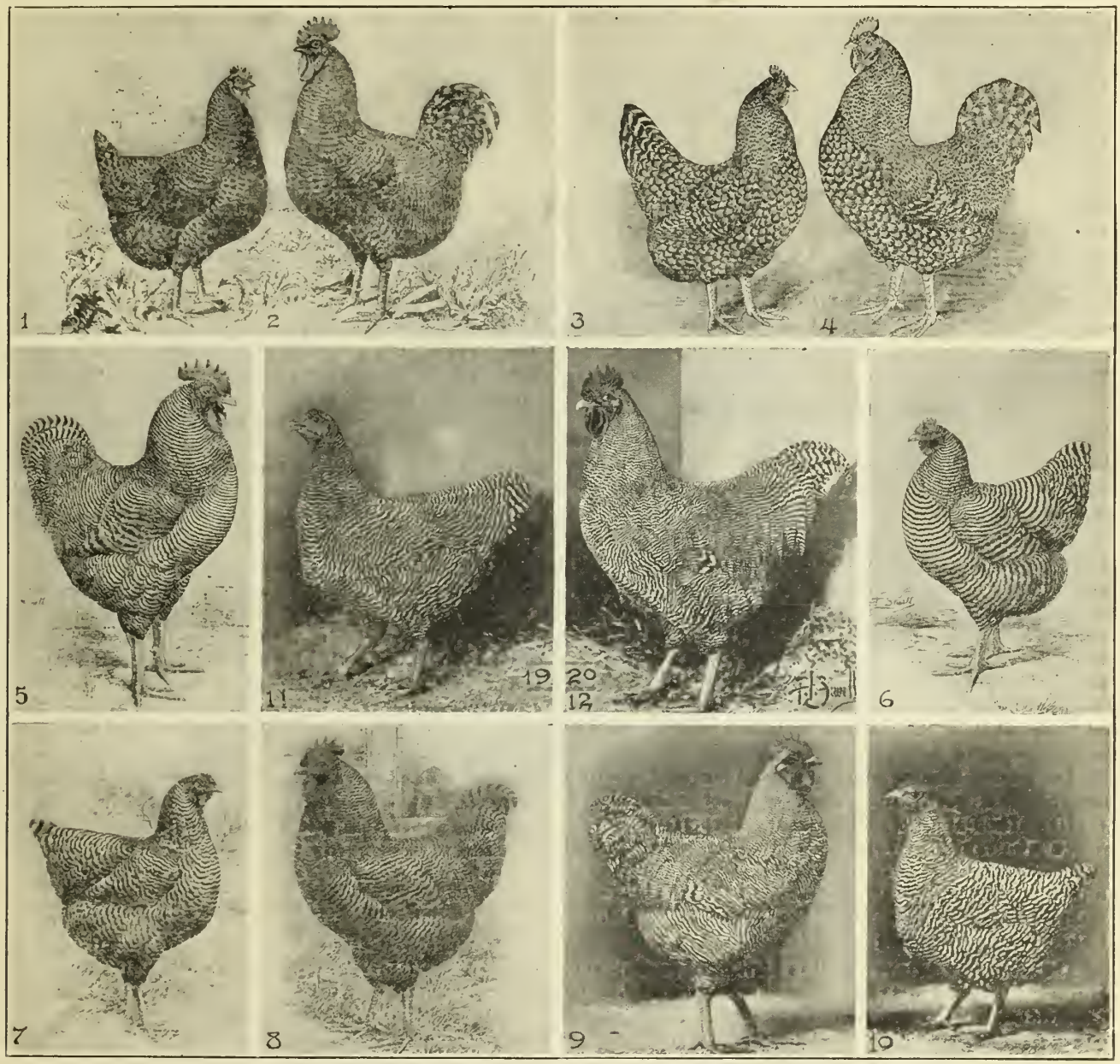


EARLY BARRED PLYMOUTH ROCKS — IN CENTER — AND THE BREEDS USED IN MAKING THE MODERN BARRED PLYMOUTH ROCK

Nos. 6-7. The earliest illustration of Barred Plymouth Rocks made three years after the first were exhibited. The birds from which this illustration was made were probably the sixth or seventh generation from a cross of 1, a Black Cochin hen, and 2, a "Dominique" and were of quite pronounced Dorking type. It is possible however that they had some infusion of blood from grade Asiatic stock. Among the crosses used to duplicate the first Plymouth Rock stock were: 3, Light Brahma male, with 4, a "Dominique" female somewhat on the Hamburg type; 5, a "Spanish" or Minorca male with 8, a White Cochin female; 9, a Birmingham White male, probably a mixture of Dorking and Asiatic, with 10, a female of Dark Brahma type or quite near it. The blending of the various strains thus made resulted after a time in types as seen at 1, 2, 3, and 4 on the opposite page. At this stage one of the breeders resorted to a "rank outcross", and mated a hen like 11, which is identical with 3 on the opposite page, with 12, a black-red Pit Game cock. The progeny of this cross most closely resembling the Plymouth Rock were bred on Plymouth Rocks, all the rest were discarded. The resulting progeny were used in the same way, in each successive generation. H. B. May who made the cross told the writer that undesired game characteristics hardly appeared at all after the third generation from the cross. To this game cross breeders generally attributed the pugnacity and great activity which are often seen in Barred Plymouth Rocks. In studying the group on the opposite page in connection with this it is not necessary to draw on the imagination to see how the graceful lines and bearing of the Game served to transform the earlier types and bring the symmetry which begins to be in evidence in the nineties.

This description applies fully and literally, however, only to the best stocks and to the finest specimens of those stocks. Although the poorest specimens of the best stocks may be vastly better than the finest specimens at some earlier period, there is still a wide range of quality in all but a few of the most highly bred standard stocks.

The novice who distinguishes breeds by a few superficial characters and cannot distinguish between individuals of the same variety does not perceive this, but everyone who is capable of judging quality sees it clearly. Hence, though the quality of the stock has improved, and the culls which ought to be discarded are not so easily picked out by a novice, the nature of the breeder's problems has not changed. Unless he carefully selects to keep the quality of his stock at the highest point it has reached, it will inevitably begin to go back, for as soon as the breeder relaxes his selection some other system begins to operate.



STAGES IN THE IMPROVEMENT OF THE MODERN BARRED PLYMOUTH ROCK

Nos. 1 and 2 show an early Barred Rock type strongly suggestive of the Dorking, yet with Asiatic characteristics shown in a more angular massiveness and in shortened tails. Nos. 3 and 4 show a more refined type of the seventies, more closely resembling Dominiques of the European races. Both of these types may still be found in poorly-bred Barred Plymouth Rocks. After the use of the out-cross of Pit Game mentioned on the opposite page, the Barred Rocks in the lines from this cross began to show a station and style which before was generally lacking. The barred birds from these lines also showed a much improved character of barring. Rapid improvement in both type and color brought the variety by the early nineties to the style and finish shown in 5 and 6, bred by E. B. Thompson. In these the illustrations show some idealization in the barring which in reality is not exaggeration, but the result of the process of making illustrations, it being impossible at the prices obtained or at the prices that breeders could afford to pay for such work to reproduce the markings on feathers accurately. Nos. 7 and 8 are birds winning in 1897. No. 7 is a pullet shown by W. S. Russell at Chicago. No. 8 is "Royal Blue", a bird of magnificent type and of good color for his time, bred by A. C. Hawkins, which became the head of the lines constituting the long famous "Royal Blue Strain." These illustrations are also from pen drawings. Nos. 9 and 10 are from photographs. No. 9 is a Hawkins' cockerel winning at New York in 1908-9. No. 10 is C. H. Welles' celebrated "Fluffy Ruffles", a hen of marvelous color and a winner at the garden in 1907 and 1908-9. Nos. 11 and 12 are E. B. Thompson's 1st pullet and cockerel at the Garden in 1920, these both being from photographs retouched only to reproduce with the greatest possible accuracy the details of color which the camera fails to catch in an instantaneous photograph.

To the present time no other system of selection has been discovered or devised that makes a satisfactory substitute for the eye of the breeder selecting to suit the requirements of the Standard to at least a reasonable degree. Following the Standard in form and color does not prevent careful selection for any other quality that may be desired. Ignoring the commonly accepted standards for improved form and color and basing selection entirely upon one or more other points not measured by the eye has always resulted, after a few years, in such deterioration in the appearance of stock that it could not maintain a reputation based upon other qualities.

While the natural tendency to variation is the great obstacle to holding type and quality when once secured, the enthusiastic and progressive breeder has no quarrel with it, for it is this same tendency to variation that makes improvement possible, and enables him to modify types to suit special purposes. If the tendency to variation, neglected and not properly controlled, can spoil the stock of the novice in a few years, that should not discourage him; for, on the other hand, this same tendency, intelligently directed and controlled, makes it possible for him to start with moderate-priced stock and, in a few years, to improve its quality to an extent nearly, if not quite, corresponding to its possible deterioration under neglect for a like period.

Qualifications of the Poultry Breeder

A successful breeder of poultry must combine with the practical skill of the good stockman something of the essential qualities of the artist, the scientist and the philosopher.

Practical knowledge of poultry husbandry, and skill in the growing of young stock and in the management of mature birds is the foundation of success in breeding. If the parent stock is not kept in prime condition the progeny will lack vitality, and will therefore be incapable of development to the highest perfection of the race type. If the young birds are not grown to secure the best development of which they are capable, the breeder can not know whether the matings he makes produce the results he seeks or not.

The poultry breeder must be a good practical poultryman, but that qualification alone will not make him a breeder. Thousands of good poultry keepers—men and women who can make hens lay and make chickens grow—are not good breeders. They either lose good type in stock that originally had it, or maintain a rough likeness to the original type by constant infusion of blood from stocks better bred than their own.

The difference between skill in caring for poultry and skill in reproducing it begins with appreciation of beauty in individual specimens. To one person a handsome bird is just an uncommonly nice-looking fowl, turkey, duck or goose. The whole bird makes a pleasing impression upon him, but it never occurs to him to analyze the effect or consider the possibilities of reproducing or of improving the characters he admires. Another person instinctively undertakes to analyze the details of form and color that produce the pleasing effects, intuitively selects those that give the specimen distinctive character, and critically compares the values of like points in different specimens. What faculty of artistic perception he possesses leads him to do this. None but beautiful birds please him. If this interest is only "skin deep" it takes him only a little way on the road to success as a breeder. Such an interest alone may make one a happy fancier, or an ordinary judge, but—as a breeder—it will not take him far from the starting place.

What makes a good practical poultry keeper a breeder, with a fine artistic perception of beauty in poultry, is the desire—amounting to a passion—to produce a race in which all the characters he prizes are blended in one harmonious type, and that type brought to the highest possible excellence. In one who with artistic perception possesses artistic talent, this desire might be satisfied to work out its ideals on paper or canvas, but it does not appear that it ever has been. Our real poultry artists have always been real breeders as well. At best, there is not a man in a million capable of becoming a first-rate poultry artist. For the working out of his ideals the artist is dependent upon HIMSELF, upon those powers of eye and hand with which nature has endowed him. According to his ability he can reproduce in line and color, and in practically imperishable form, the best specimens of his times, both as they are and idealized.

The breeder works in living material, reproducing not its exact likeness, but its near-duplicate in substance and in every characteristic. The results of his matings follow natural laws of which he has incomplete knowledge, and over which his only form of control is to provide that birds shall mate only as he wishes them to breed. While all the knowledge of the laws of heredity that he can obtain is helpful, it is not so much systematic knowledge of laws that enables him to get the results he seeks as extensive and well-considered knowledge of the effects of the laws—especially in the reproduction of the breed, the variety, and the strain he is working with. So while the breeder's work borders on science, breeding is far from being an exact science.

The philosophy of the breeder is a mixture of idealism, fatalism and commercialism. He is an idealist by nature, a fatalist by training, and a commercialist from necessity. As an idealist he delights in difficult and even unattainable standards. As a fatalist he does what man can do toward the attainment of his ideals, awaits the action of natural laws with composure, and accepts disappointments and losses through means beyond his control without discouragement. As a commercialist only an occasional poultry breeder achieves distinction, for the tendency with all is to concentrate their thoughts and energies upon production, and to give only as much attention to selling as is necessary to keep the income from poultry somewhere near the expense on its account.

Breed and Breeder Technically Defined

Having considered in detail the characteristics of breeds and of breeders we can now give instead of the faulty and misleading popular definition of the term "breed" this correct technical definition:

A breed is a race of domestic animals, or birds, in which certain distinguishing shape characters have been so fixed by selection that they are common to the race—though they vary in individuals to an extent that makes continued selection necessary to maintain them in their best form.

And with this technical definition of a breed it is appropriate thus to define a poultry breeder:

A poultry breeder is a skilled poultry keeper whose appreciation of the useful and beautiful qualities of poultry compels him to study and strive to produce stock in which all the characters he prizes are blended in one harmonious type, and that type brought to the highest possible excellence.

CHAPTER II

Breed Shape and Type in Fowls

Original Wild Progenitors of Domestic Poultry, As Far As Positively Known, were Useful Types — Reasons for Rejecting the Theory That the Little Wild Jungle Fowl Was the Progenitor of All Domestic Races and Considering the Probable Ancestor a More Useful Type—Development and Characteristics of Game Types, Laying Types, General Purpose Types and Meat Types.

IN this chapter we shall consider in detail the characters of fowls which have been made breed characters, describing and comparing them, and trying to give the reader clear conceptions of the types that have been established, the reasons for adopting these types rather than others, and the limitations upon the multiplication of breeds which are created by the necessity for keeping breed types distinct.

Original Species of Fowl

The study of breed type and shape begins with consideration of the original wild species of fowl from which all our domestic races are derived. In the early days of the Darwinian period naturalists and some poultry writers were inclined to accept the view that certain differences in the structure of fowls of different races could be accounted for only on the theory that there were two original types. The distinctions they tried to make were not well founded, and the sounder view of a single origin was soon generally accepted by those competent to form opinions upon the subject, and is generally accepted now without question.

D. A. UPHAM
Commonly accredited originator of Barred Plymouth Rocks. He was first to exhibit them and bred the best of the earliest strains.

With the acceptance of the probably correct view that all races of domestic fowls are descendants of a single wild species, there was also general acceptance of the probably erroneous view that the Indian jungle fowl, called by naturalists Gallus Bankiva, was the original species. Indeed, writers on the subject generally are accustomed to state that this is so with a positiveness that would be warranted only had the case been clearly proven, while the fact is that there is no direct evidence upon the point, and such inferential evidence as may be brought forward quite strongly indicates that the original species was a much more useful and desirable type than the little jungle fowl which bears a striking resemblance to our most common Game Bantam. The more reasonable view is that the jungle fowls, like the bantams, are degenerate races of a species originally much larger, though by no means as large as our largest improved breeds.

Wild Species of Other Kinds of Poultry

All the other kinds of domestic birds had wild progenitors that were either of great economic value, or easy to tame and ready to adapt themselves to the conditions of life in domestication, or in some measure combined these desirable qualities. The turkey, the only one of our several kinds of domestic poultry indigenous to America, still exists here in the wild state, and wild turkeys are still used to improve domestic stocks in certain particulars. The domestic duck of the most familiar type is unquestionably derived from the wild Mallard, which is still frequently caught and domesticated, and which after a few generations in domestication comes to resemble the Rouen Duck in size and shape. As the Rouen retains the color of the Mallard, it appears quite plain that the process of making domestic ducks from wild Mallards has been repeated probably thousands of times since men began to hunt and snare wild fowl for food.

With regard to the common varieties of the goose, the connection with a particular wild form, still widely distributed, is not so clear, though the wild "gray goose" which is the supposed ancestor of European races of domestic geese is said to breed still in the northernmost parts of the British Isles. In America the Wild or Canada Goose—our common wild goose—breeds so readily with the domestic geese derived from European and Asiatic sources and is bred pure in confinement with so little difficulty that no one familiar with the facts can fail to see a close relationship between wild and domesticated geese. The peafowl is still found wild in Asia, the guinea fowl in Africa, the pheasants of many species in Asia, and the Muscovy Duck in South America. In all these and in the wild pigeon of the Old World, which is identical with some stocks and types of the domestic pigeon, we find the wild type a very useful one—large enough to be of considerable importance for food, and docile enough to propagate so well in confinement that those who attempt to domesticate wild individuals have some encouragement from the beginning.

Modern Pheasants and Primitive Fowls

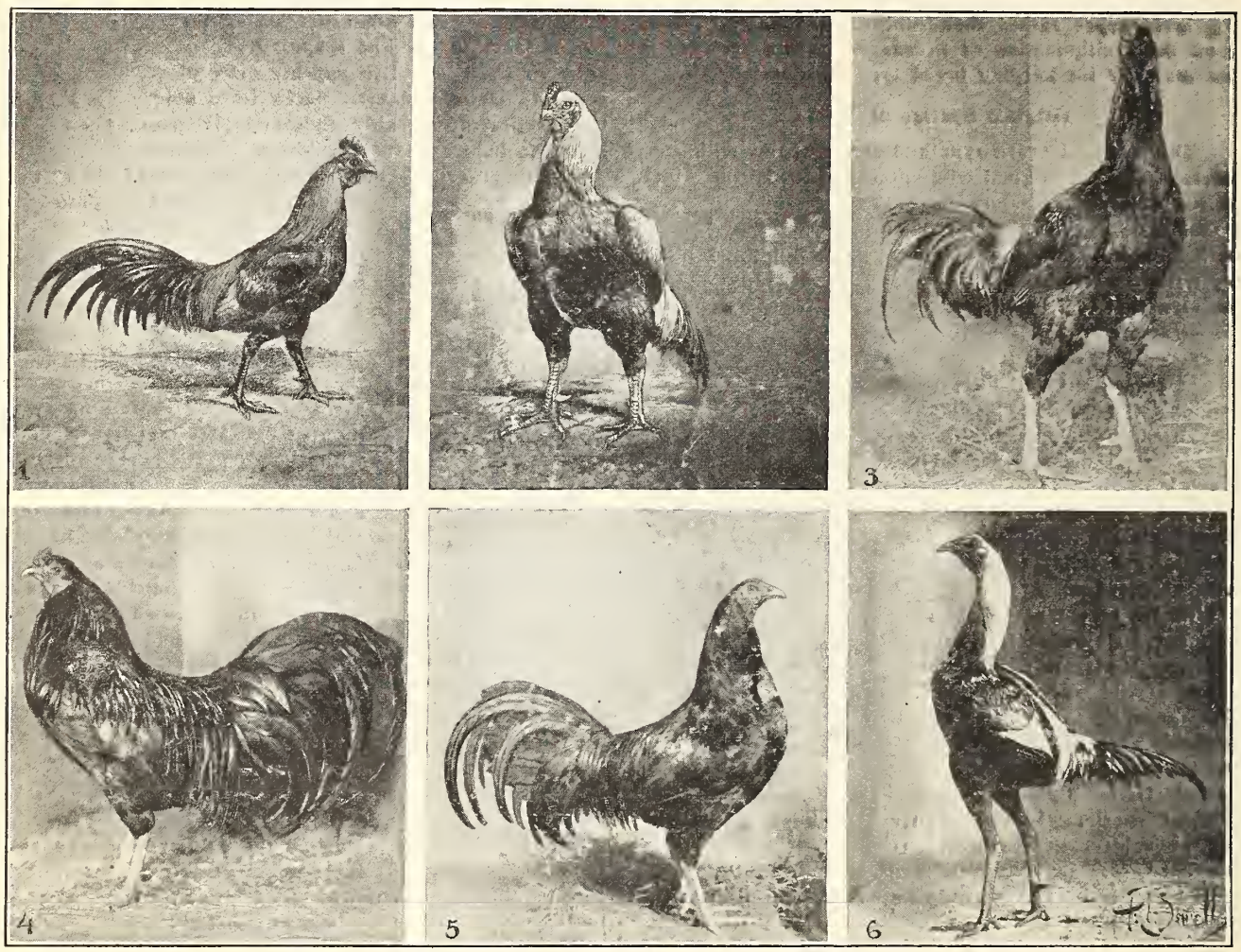
But if we consider the little jungle fowl the parent stock of all races of domestic fowls we are at once confronted with improbabilities and paradoxes. While it is said that the wild cocks from the jungles often mate with domestic hens running at large in India, and produce offspring which will breed readily with either parent, the attempts of English poultry fanciers in India and Ceylon to experiment with crosses of jungle and domestic fowls were discouraging because the jungle fowls were so wild and shy, fertile eggs were hard to secure from mixed matings, and what chickens were hatched were difficult to rear. Altogether, the discouragements were so great that fanciers who went into the experiment in a scientific spirit

and manner were soon discouraged. The few jungle fowls that find their way into aviaries in Europe and America seem less adaptable to domestication than most of the varieties of pheasants.

Any poultry breeder who is familiar with the habits of the pheasants that have been liberated in various parts of the United States to take the place of native wild land birds that had disappeared from those localities, and who has seen specimens of jungle fowl, knows that the pheasants are much more desirable and better adapted to domestication than the jungle fowl. Those who have seen some of the fine collections of pheasants that have been exhibited at the Madison Square Garden Poultry Show or that are kept in aviaries, have also observed that some of the rare varieties are as large as medium-sized fowls, and quite disposed to be friendly with anyone who will give them a little attention. Whether such docility is characteristic of their species cannot be determined from the small numbers that have been seen in captivity, but if the known specimens are docile it is fair to assume that this is characteristic of the race, until further acquaintance with it shows the need of modifying or changing the view on that point.

In the pheasants we have the class of wild birds nearest to the domestic fowl, and that would afford good material for domestication if we had not the domestic fowl. The many kinds of pheasants are all indigenous to that part of Asia which was the "cradle of the human race," and undoubtedly also the native home of the wild ancestors of the domestic fowl. It is therefore entirely reasonable to suppose that the original wild fowl was known to our primitive ancestors as the most desirable of the land birds with which they came in contact—so much better for purposes of domestication than any other land bird known to them that eventually practically the entire species became domesticated, while little effort was made to domesticate the other kinds.

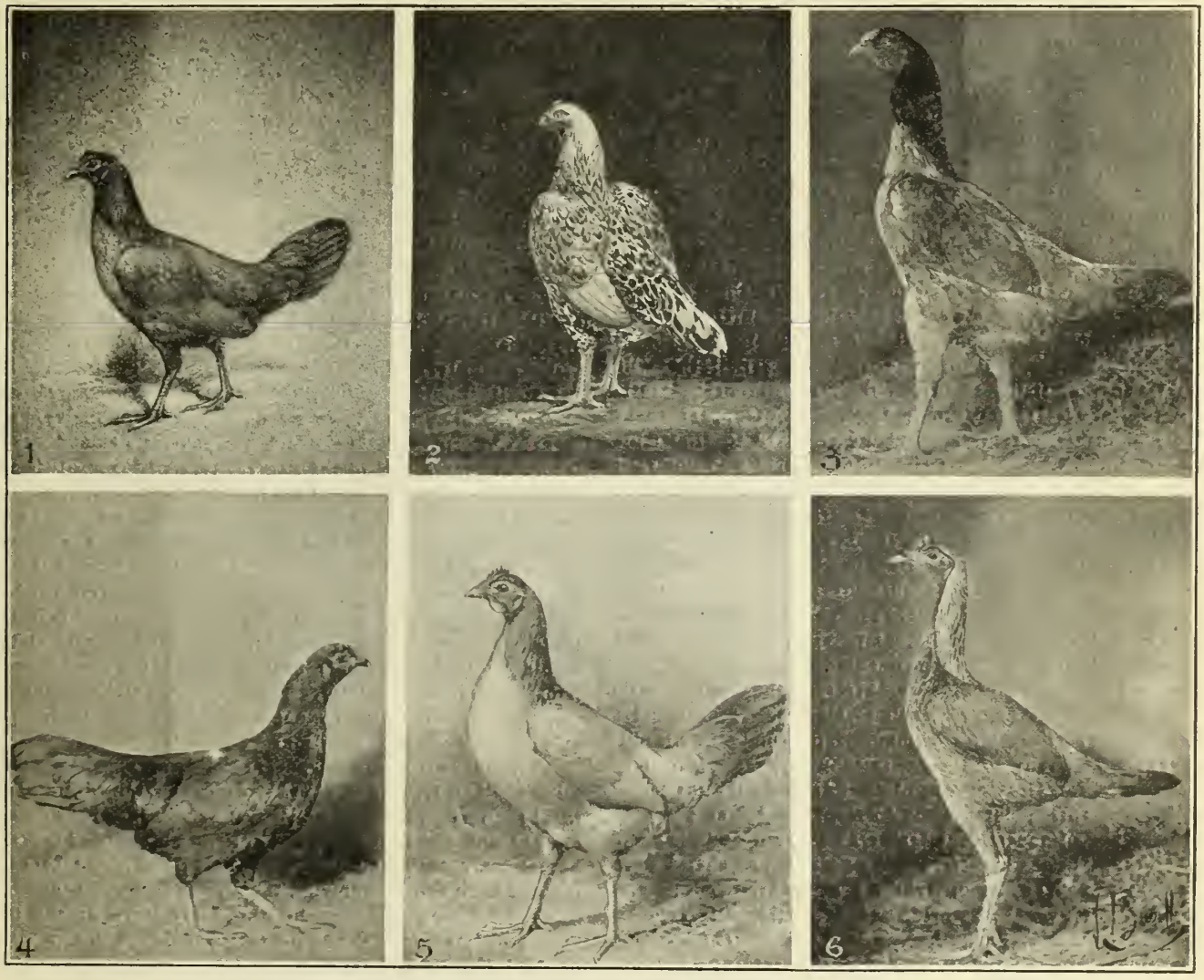
Some observations on the behavior of the common pheasants liberated in Massachusetts to propagate as game birds, suggest the probability that the wild species of fowl was not only well adapted to domestication, but that in numerous instances the birds came to men for protection from other enemies, or to friendly men for safety from those who were hunting and destroying them. During the term of years when sportsmen were not allowed to shoot pheasants, the birds which were in small flocks nearly all over the state—many of them in the uncultivated tracts in populous districts—became very tame and bold. Many instances were reported of pheasants coming to poultry houses to eat with the fowls in winter, and sometimes remaining until the snow was gone in the spring. Often in summer they came into gardens near their



THE SIX MOST IMPORTANT TYPES OF GAME FOWLS — MALES.
1—The Jungle Fowl (Gallus Bankiva). 2—Aseel. 3—Malay. 4—Sumatra.
5—Old English Pit Game. 6—Modern Exhibition Game.

habitat, and did a good deal of damage. It was permitted to kill them under such circumstances, but few people did so, for it was generally considered that in destroying insects on the uncultivated lands where they mostly ranged they rendered service that more than compensated for the damage done to crops.

In the first year that killing by sportsmen was allowed, many hunters who knew where flocks of pheasants ranged went to these places before daylight on the first day of the open season, and shooting began as soon as the birds could be seen. In a great many instances the birds that were alarmed but not hurt, instead of seeking home, used by the children of the neighborhood as a play ground, which was bordered on one side by a wood in which a small flock of pheasants had become established. When hunters attacked these birds in the woods, what pheasants escaped their shots, instead of going into deeper woods, made for the field where the children were playing, and where for the time they were safe. Such instances as these were not exceptional, but cases of similar character were reported from many places. The pheasants when they found themselves in danger seemed instinctively to try to get into the vicinity of human beings not aggressive toward them.



THE SIX MOST IMPORTANT TYPES OF GAME FOWLS — FEMALES

1—The Jungle Fowl (Gallus Bankiva). 2—Aseel. 3—Malay. 4—Sumatra. 5—Old English Pit Game. 6—Modern Exhibition Game.

protection in the woods, made for the vicinity of dwelling houses. Before breakfast on that day two hen pheasants, presumably from a flock established about half a mile away in a wood, came into the writer's yard. On the following day a hen with a brood of half-grown chicks came to the door, and for several days this hen and her brood escaped the observation of hunters by keeping under the cover afforded by low-growing brush on vacant lots on the outskirts of the village. What became of them afterwards is not known.

A well-known poultryman in an adjoining town a few days later pointed out to the writer a field opposite his

If the law did not protect the pheasants at all they would be exterminated in a single season, except as individual human beings protected them—as some endeavor to do by prohibiting shooting on their land, thus making it a safe place for the pheasants even when the law permits their destruction on land that is not "posted." This situation with reference to pheasants in the present time shows quite plainly how a bird of the same general type, but more desirable, and probably even more docile and more ready to turn to man for protection, would cease to exist in a wild state within a comparatively short time after its domestication began. It is reasonable to sup-

pose that this would take place with a type of fowl that was more desirable and more ready to be domesticated—more inclined to turn to men for protection, than any of the pheasants that are well known. But it is not reasonable to suppose that primitive men, in contact with all the kinds of land birds indigenous to Central Asia, passed by a number of species such as the pheasants and proceeded laboriously and persistently to develop such birds as the jungle fowls into something highly useful and thoroughly domestic.

Required Foundation Type for Domestic Races

I have gone thus at length into the argument to show that the ancestral race of our domestic fowls was not the little jungle fowl of India, because it is of the greatest importance in the study of the types that have been developed in domestic fowls to have a basic type that will appear as a suitable type from which to develop all the breeds and varieties that we have. In every other kind of poultry we have known wild ancestral types not so different in size and essential characters from an average domestic type. In fact, our unimproved stocks of turkeys, ducks and geese may be benefited in some respects by mixtures with wild stock. But for the most common and most useful kind of domestic poultry the generally accepted theory gives a wild ancestor so inferior to the ordinary unimproved domestic stock that it would be of no value as a means of improving it, even if the wild race had the vitality to breed freely with domestic stock. In breeding tests the jungle fowls do not appear to be normal in respect to fertility and capacity to contribute something of the original vitality of a species to domestic stocks which have reduced vitality. On the contrary, they appear as degenerate races either from common domestic fowls of the regions where they are found, or from some remote common ancestral species.

The most reasonable conjecture as to the original of the domestic fowl is that it was a bird several times as large as the jungle fowl—plump, vigorous, bold rather than timid, and probably inclined to attach itself to man for feed and protection, as we have seen the common wild pheasants do. When we assume this type we have not a remote type at all, but a common type—though quite different from many of the conspicuous types in improved fowls. In fact, leaving out of consideration the matter of color and such points as the form of comb, the presence or absence of superfluous feathers on heads and feet, and other superficial characters, the original type that I have indicated is the common type of unimproved or mongrel poultry all over the world, and is further the type to which improved stock of all but the largest breeds and the smallest ones—the bantams—quickly returns when not well bred and well grown.

The one particular in which a large part of the ordinary fowls of the size and general character described differ from the original wild stock of the species is that in domesticated stock plumpness would not be as general a characteristic as in wild stock. Wild birds of all kinds are mostly plump, because without the good muscular development of which plumpness is the result, young birds in a state of nature fall an easy prey to their enemies, and are also at a disadvantage compared with their robust companions in searching for feed. While none of the land birds have the capacity for long flights, all of them in a state of nature are able to use their wings enough to give them the advantage over anything pursuing them on the ground by flying into trees where their pursuers cannot reach them, or alternately flying and running until the pursuer is distanced. In wild birds, the habit of flying even to this extent gives better development of the breast, which is composed of the muscles of the wings, than is usual in fowls in domestication. Without the good development of the wing muscles, which more than anything else makes for plumpness in fowls, young birds in a state of nature fall an easier prey to their enemies, and only the well-developed ones ordinarily survive to maturity. In domestication, on the other hand, the weaklings are protected and the stronger ones are discouraged as much as possible from making free use of their wings. Also it is common for poultry keepers who take no interest in the improvement of their stock to kill their best birds first, because they are the first that are large enough to eat. All these things combine to make plumpness less characteristic of ordinary domestic fowls than it probably was of their wild ancestors.

Leaving out of consideration shape and size of combs, wattles, crests, beards, and other head characters, and also leaving out length, texture and abundance of plumage, the type assumed as that of the original wild fowl is the type of the Leghorn, Campine, Hamburg and Polish, of Europe; of the Yokahama, of Japan; and of most races of game fowls that are bred for the cock-pit, or simply bred without reference to the characters developed in special breeds of game fowls. In other words, it is the type that all these races have when not standardized to distinctive breed form. In considering all the breeds named it should be understood that when we speak of their general type of body we do not refer to the refinements of form and type which the fancier demands and labors to secure, but to the general type of fowls of these races as they run. These named breeds are mentioned by way of illustration because they are the stocks with which people are most familiar at the present time. The common native fowls so-called of the United States, before the use of improved stock became so general, were of the same body type. Our basic type in domestic fowls is therefore a species in which adult males in the wild state would probably weigh from three to five pounds, and females average about three pounds—the weights varying considerably with the abundance of feed and with favorable or unfavorable conditions of growth.

Starting with such a type as this we can show how all the other types and breeds could be derived from it in the course of reproduction, as modified by circumstances and conditions, or controlled by poultry keepers having only such knowledge of the principles of breeding and such skill in applying them as persons of ordinary intelligence would pick up for themselves in their experience with the fowls known in their locality. This cannot be done if the basic type, or original type of the species, is an extreme type in any particular. When consideration of the colors and color pattern of fowls is taken up in the next chapter it will be shown that all the elements of color and markings that have been developed in modern improved breeds and varieties of fowls were present in the wild species, giving possibilities of variation in color and development of color markings through a perfectly natural combination of inherent tendency to vary, and the simple methods of control which would naturally suggest themselves to an observant and ingenious poultry keeper. The same condition is necessary in the development of breed types. One may say as a general statement that all breeds and varieties are derived originally from the Gallus Bankiva, and as long as he is not required to show in detail how it was or might be done the statement may pass. But as soon as it is necessary

to go into details and to be specific, and show the relations of all types, that theory breaks down, and the only theory that will meet all the conditions and requirements of the case is the one I have given.

The Game Types

In considering breed types we begin with the Games because it is hardly open to doubt that the type of the original species is more faithfully preserved in some of the game fowls than in any other groups. It is in what may be called the intermediate game types, and in individuals that are perhaps not regarded as the finest models of their type, that we probably find the best modern representatives of the original wild species. There is no reason to suppose that the pugnacity of the fighting game, or the characteristics of form which are the result of many generations of breeding especially for strength and endurance in battle, were developed to anything like the same extent in nature that they have been in these races in domestication. The Pit Games of various names and slightly different types show us how the original type was modified by selection for fighting qualities, without particular consideration of the influence of such selection upon their value as layers or as table fowls.

The best fighting type of fowl carried an abundance of meat for its size and weight, but was rather hard and dry fleshed. It had short, close plumage and a relatively small comb. The shortness of its plumage made it better suited to warm temperature and tropical climates than to cooler regions, and it is significant of the influence of practical considerations upon the distribution of types that in climates where the shortness of feather of the typical Pit Game was not a disadvantage, but possibly an advantage, they frequently were the common type of fowl. In colder regions, however, the type was not generally popular, and interest in it was limited mostly to those who liked and kept games for their fighting qualities. The well-known races of game fowls were all developed in Southern Asia and the adjacent islands, and in the British Isles, and in the New World these types have been most prevalent in the Southern States and in Mexico and Cuba.

The old English Game and the Sumatra Game are good representatives of what may be called a normal fighting type derived from the original type, without exaggeration in any direction. The Aseel Game of India shows a sturdier frame, with a remarkable development of bone and muscle in compact form. The Malay Game is a very large, coarse game type which appears to be as closely related to the large Asiatic fowls (Cochins and Brahmas) as to the more typical games. The jungle fowl (Gallus Bankiva) appears in a study of types as a Game Bantam—a degenerate type. The modern Exhibition Game, also sometimes called the Standard Game, was developed as a game type distinctly different from the fighting type by poultry fanciers in England who liked the game fowl but were not enamored of cockfighting. The extreme development of the length of leg and neck was a fancier's fad, originating—it is said—in the fact that birds with this tendency were less "game" than the more compactly built type, and consequently more suitable for those who desired to breed away from the pugnacious character. While there is something in this theory—the type certainly not being a fighting type—it does not follow that lack of pugnacity could not be obtained in the other type. But however it began—when once it became the aim of breeders of Exhibition Games to breed to extreme high station, it was rapidly carried to such an extreme that the birds were often repulsively unsymmetrical, and being so abnormal in structure lacked constitution and vitality. They were for a time quite popular with fanciers in America, and continue to have some standing in England, but their chief interest in the study of breeding is to illustrate some of the important principles. Exact reference on this point will be made in appropriate connections.

The Egg Types

With the exception of the game types, all the other races which have been mentioned as of the general type which was probably that of the original species of fowl, were developed in Southern and Central Europe, and are of what is commonly called the egg type, or the laying type. The application of this term is only relative. Good layers are found in all types of fowls except where extreme development of particular characters affects general vitality and constitution. Even in these, occasional hens may be excellent layers. The laying type is a type better suited to egg production than to meat production, and comparatively easy to keep in laying condition and producing eggs profitably.

The Leghorn is at present the most familiar representative of this type, and it is entirely reasonable to suppose that the Leghorns as they came to us from Italy, where they were the common fowls of the country and not differentiated into distinct colored varieties, were just such fowls as the original wild species became at an early period in their history in domestication in everything but the extreme development of comb and wattles. Indeed it is not impossible that that development also was made long before the fowls were introduced into Italy, for high feeding and high temperatures combined always tend to increase the size of the comb, and if to these was added a little systematic selection of the largest combed birds for breeding, that character would become well established in a period easily within the experience of a single human being taking an interest in the matter. Without high feeding, and with generally indifferent care, fowls of this type would be like scrubby little Leghorns with small combs, and that is the character of unimproved and more or less neglected fowls where such still remain in different parts of the earth today.

Besides being the most familiar breed of the egg type, the Leghorn is the principal representative and apparent progenitor of all the other breeds which have come from Southern Europe, and which in the Standard are grouped together as the Mediterranean class—the Ancona, Andalusian, Minorca and Spanish. The conspicuous common character of these Mediterranean breeds is the large comb and wattles. Though the breeds of Spanish derivation in the Standard are larger and heavier than Leghorns, this difference does not obtain in the original native stocks, but as far as size and shape of body and of comb are concerned they were all alike. The single comb is the original form of comb, and in these warm regions a large single comb was not objectionable on the score of susceptibility to cold.

In the old European stocks of the Hamburgs, Campines and Polish, developed in the colder regions of Central Europe, there is the same general body type as in the Mediterranean class, but instead of the large single comb there are smaller single combs, rose combs, small V-shaped combs, crests and beards. All these developments are in the line of modification of head points to adapt the breeds to more rigorous climates while still making the head characters ornamental. It is by the head characters and the color of the plumage that these

breeds are commonly identified. As bred by modern breeders to meet standard specifications, all breeds have certain peculiarities of form in accordance with which those versed in such matters determine whether an individual has the correct type of its breed, or to what extent it departs from that type; but the differences in body are all variations of a common form, while in these other points there may be a complete change of the form of the character.

It does not appear that any of the peculiarities of the Polish and Hamburg types were clearly differentiated and well developed until comparatively recent times. That work appears to have been done principally first by Dutch and Belgian, and afterwards by English breeders within a period beginning no farther back than about the time of the American Revolution. The Hamburgs and the Polish were the first of the improved European egg-type breeds brought to America. The Hamburg was—before

EGG TYPE OR LAYING TYPE BREEDS OF FOWLS—MALES.

1—Leghorn (Single Comb White). 2—Polish (White). 3—Ancona. 4—Andalusian (Blue). 5—Minorca (Black). 6—Spanish (White Faced Black). 7—Campine (Golden English). 8—Hamburg (Golden Penciled). 9—Redcap.

the Leghorn became popular outside of Italy—considered in Western Europe and America the egg type par excellence, but with the Polish a close second. The old time Hamburg and Polish were of a rather more rugged and robust type than is usually found in those breeds today, but by no means hardy enough to suit the conditions of poultry life in America when interest in improved poultry began to spread here. With proper accommodations for fowls that were not very robust, and with good care, the Hamburgs were great layers of rather small eggs—the typical Hamburg egg being rather long and the lines of the sides flattened lengthways. The birds themselves were, and often still are, rather finely drawn in body.

The Polish were usually larger than the Hamburgs,

EGG TYPE OR LAYING TYPE BREEDS OF FOWLS—FEMALES.

1—Leghorn (Single Comb White). 2—Polish (White). 3—Ancona. 4—Andalusian (Blue). 5—Minorca (Black). 6—Spanish (White Faced Black). 7—Campine (Golden English). 8—Hamburg (Golden Penciled). 9—Redcap.

and plumper in form, many of the birds being extremely graceful and attractive developments of what might be called a rotund egg type. Their crests were much smaller than the crests of the modern exhibition type, and in the greater number of specimens seen were no larger than the average crest in the modern Houdan. In temperament they were a decided contrast to the Hamburgs. The latter were inclined to be nervous and shy. The Polish were quiet and very docile, and this characteristic was noticeable also in the fowls produced by crossing Polish on the old native stock. They laid larger eggs than the Hamburgs and eggs of nicer form. They were also better table fowls. Both of these breeds were quite extensively kept, in small flocks, for eggs for some forty to fifty years after being introduced into America, but were eventually displaced by fowls of the Mediterranean class, and have since been bred only by those interested in their exhibition.

The modern history of the Campine furnishes a fine illustration of the influence of practical considerations upon the ideals and work of fanciers and upon poultry standards. The common Campine of the district in Belgium from which it takes the name is simply an unimproved, single-combed type of the Penciled Hamburg. European fanciers paid no attention to it until about 1890. Then it was taken up both in England and America. The specimens brought here were small, not at all attractive, and as wild as the wildest of the old native poultry. Because some then influential members of the American Poultry Association were interested in it, the Campine was admitted to the Standard in 1893, though almost unknown here. Neither the prestige of this recognition, nor all the publicity given it could develop any wide interest in it at that time. In 1898 it was dropped from the Standard on the motion of men who had been instrumental in securing its recognition only five years before. About ten years later the Campine reappeared in the distinctive type which is now the standard, having also been much increased in size. This result was brought about by English breeders developing it as a layer of large white eggs, and changing the character of the feather markings and the development of the tail feathers. Aside from the "hen-tailed" feature, the type of the modern Campine has been developed toward ideals for Mediterranean types rather than on Hamburg lines, which cannot well be preserved in a heavy layer of large eggs.

Until toward 1900 Minorca and Leghorn types in America were not at all clearly differentiated. Most of the Minorcas distributed throughout the country were little, if any, larger than good-sized Leghorns. The change was made by the introduction of English stock of large size, and by breeding for large white eggs. The Spanish, which have been very rare in this country for some thirty years now, came in at about the same time as the Hamburgs and Polish, and for a long time had considerable popularity, occupying much the same relative position as producers of large white eggs as the Minorcas did later. The conspicuous breed distinction of the Spanish is the remarkable abnormal development of the skin of the face and ear lobes until the white "enameled" surface covers a large part of the front of the neck, and extends down upon the breast well below the end of the long wattles. In the Spanish of half a century ago the white face was only moderately developed, covering an area only about twice that of the face and ear lobe of a Leghorn or Minorca.

The appropriateness of including the Redcaps in a list of breeds of the egg type is debatable, for its relation to the Hamburgs is similar to the relation that some breeds that are classed as general-purpose types bear to the egg types to which they are near akin. The Redcap, however, has in its most exaggerated form the large rose comb of the laying types having rose combs, and this superficial feature would seem to make it out of place in a class to which, were body type alone considered, it would quite plainly belong. So it is included here with the egg types.

The Buttercup is a nonstandard fowl of the general egg type, which is alleged by some of those promoting it to have originated in Sicily, and by those who hold this opinion is sometimes called the Sicilian Buttercup. Evidence as to the European origin of the breed is not convincing. It appears that similar fowls were known here by other names long before those said to have come from Sicily were brought in, and they are not mentioned by any European authority, nor do they conform to any description of an Italian breed by such authority. Its most distinctive breed character at the present time is its peculiar cup-shaped comb, which was apparently produced from some mixture of fowls having large single combs with one of the breeds having a V-shaped comb.

So we have nine breeds that either are now or have been representatives of the general laying type, or egg type. And while the characteristics by which these nine breeds are identified and distinguished from one another by those not versed in all their standard requirements are the points most striking and conspicuous to a novice (head points, color, etc.), these are in reality only secondary breed characters. The primary breed characters are shape, size, and carriage of body—as they appear in the living bird—the combination of these characters giving the bird its type. The bird is of the correct type of its breed only when these characters are so combined that it has the type which has been determined upon as the standard type of the breed—the type in which all its qualities find their best and finest expression.

To a novice it often appears that those who make the standards draw the distinctions between breed types too fine; that if ordinary variations in one type will give specimens off-type for their own breed and suggesting or approximating the approved type for some other breed, the sensible thing to do is to make breed differences so marked that there can be no confusing the types even by those least familiar with them. That is a matter in which the novice will do well to put off the formation of a positive opinion until he has acquired some familiarity with the whole subject of breeding. To discuss it here would be premature, but the reader who is disposed to consider such phases of the culture of standard poultry illogical and arbitrary is advised to take careful note of the many points that will come up in this book showing good reasons for things which at first may seem to him quite unreasonable.

Dual-Purpose or General-Purpose Types

On the continent of Europe little attention has been given to the development of table poultry. What has been done there in that direction will be specifically treated in the section of this chapter relating to breeds of the meat type. In England the development of table poultry received much more attention, and in progress toward the finest table type poultry keepers in several districts produced a dual-purpose type of fowl much like the modern American Plymouth Rock in body type and general characters and adaptability. Even where departure

from the general type (which we have assumed to be very like the original type)—that prevailed on the Continent was not so definite, it would appear that the common fowls of the British Isles, at an early stage after their introduction from the Continent, were developed away from the original type in the direction of the fighting game type, or of a meatier form of the original type. In others, development was in the direction of one or more old forms of that type which it is reasonable to suppose may have been brought from the Continent in the several permanent invasions of races from just beyond the Channel and the North Sea, as well as in the Roman invasion to which it is customary to refer as the probable period of the introduction of fowls to Britain.

But such progress as was made in England in old times toward the development of dual-purpose fowls had little direct influence upon poultry culture and the development of breeds there in more modern times. From the beginning of modern interest in the improvement of poultry, English breeders were beyond all others devoted to the development of superficial points in breeds created elsewhere, and to the making of new varieties. The dual-purpose type, neglected and all but forgotten in England, was recreated in America from a variety of different materials by breeders who—so far as can be learned—knew nothing of the old English stock of like general type, and supposed they were producing something altogether new. As a matter of fact, many stocks of the newly made type were distinctly new in composition.

Those who are acquainted with the history of the modern Barred Plymouth Rock know that it was named for a breed presented to the public twenty years earlier, and which for a time appeared likely to have great popularity. But it is not so well known that the earlier Plymouth Rock, which the man who exhibited it by that name claimed to have been made by crosses of "Shanghai, Malay, Game, Turkish and Indian," and which he stated also contained Dorking blood, was at the time described by an apparently competent observer as "the old English stock known as the Plymouth Rock breed." Nor is it as widely known as it should be that the description of the Bennett Plymouth Rock would apply very well as a description of the general type of the modern American class comprising the Plymouth Rocks, Wyandottes, Rhode Island Reds, etc., the weights as given being nearer those of the standard Plymouth Rock than those of the other breeds of this type. This last point perhaps has no particular significance; it can hardly be more than a coincidence. But the evidence that a breed of this general character was known in the middle of the last century, in the eastern part of Massachusetts, as "old English stock" is profoundly significant.

The general stocks of fowls in America at the time were of small birds—very much of the primitive type we have assumed—such stock, in fact as might be expected to come from the long-continued practice of letting the poultry on most farms find the greater part of their living, and killing the best for the table. The statement just quoted seems to show that the type of the "old English stock" brought over by some of the early settlers was pretty well preserved for over two centuries, and continued to be known locally as a distinctive type until general interest in the new and strange breeds that were being introduced caused it to be lost sight of—just as the same type was lost sight of in England.

The particular stock that brought the type back to notice and popularity—the Upham Plymouth Rock—was produced by crossing a cock, described as of "the old hawk-colored stock," on Black Cochin hens. The cock used was of the Dorking type, as is fully evidenced by the fact that the outline of a White Dorking cock drawn by the English artist Harrison Weir, and published before the Upham Plymouth Rocks were made, was taken as a model to show his type. Other early strains of Plymouth Rocks were made by other combinations, some with and some without Dorking blood, but the Dorking type of body was so pronounced in the new breed that for some years after its appearance it was shown at numerous exhibitions in the Dorking class. The most important respect in which the new representative of a simpler type akin to the Dorking differed from the English types from which the Dorking appears to have been developed, was the mixture of Asiatic blood bringing hardiness, yellow skin (for which a preference grew up early in America), brown eggs and small combs, and feet with the normal number of toes—four.

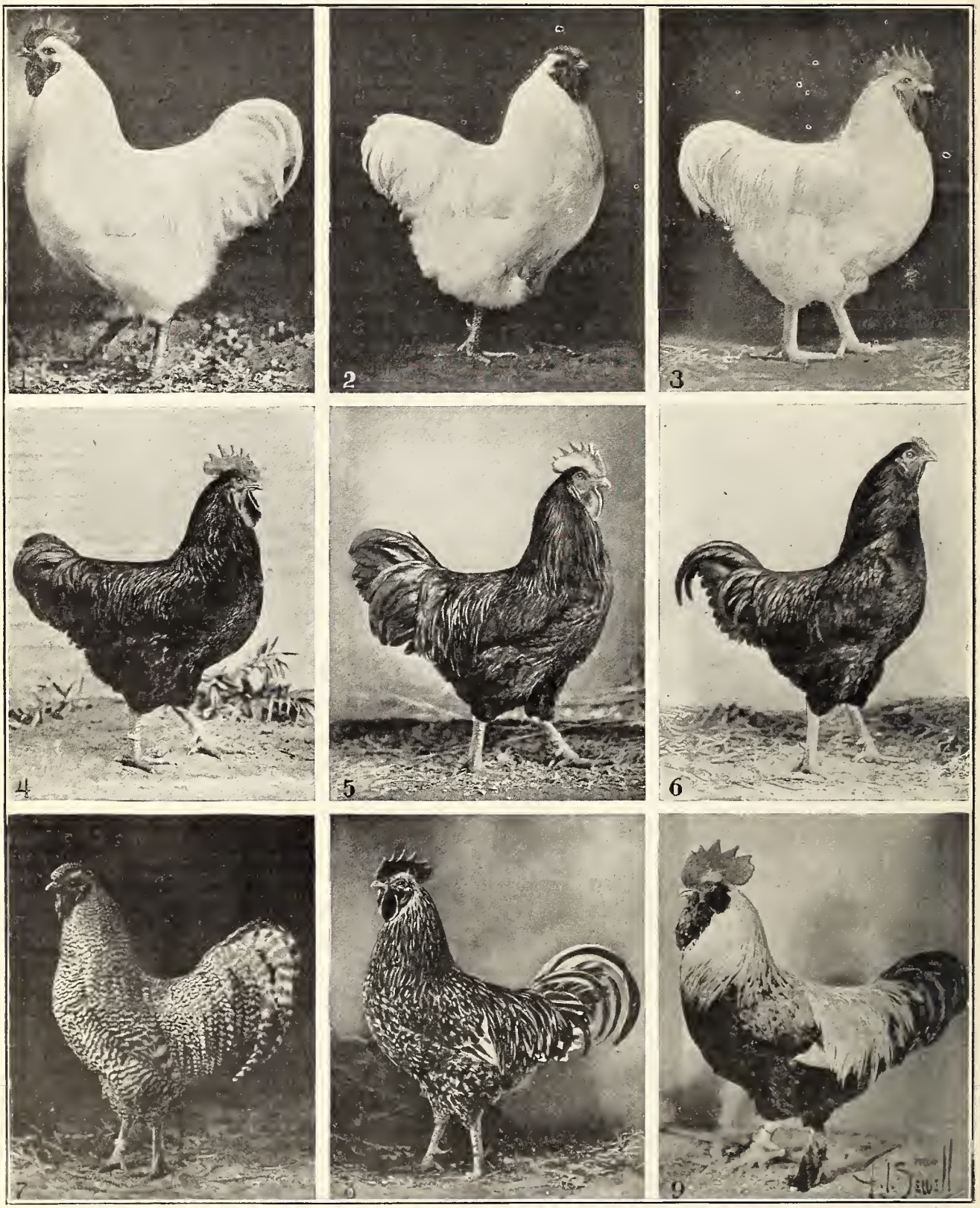
The farmers of America especially objected to the general lack of hardiness in all the improved breeds brought here from Europe. They objected also to all superfluous features, such as large combs and crests, the fifth toe on the Dorking and some other breeds, etc. In spite of these objections, the Dorking had been rapidly growing in popularity until the appearance of the Plymouth Rock. The new breed was somewhat like the Dorking in body type, though not developed so especially with reference to table qualities. The fowls were more active and rugged and free from the encumbrances of large comb and wattles and superfluous toes, which gave the farmers a breed that was a dual-purpose breed with reference to the production of eggs and meat, and a general-purpose breed with reference to its adaptability to conditions affecting the popularity of breeds and the methods of handling poultry.

With the qualities and merits described, the Plymouth Rock was a rather large fowl, often slow to mature and inclined to be a little rangy and scrawny until near maturity—these features coming from its Asiatic ancestry. Many poultry keepers wanted fowls a little smaller at maturity, quicker growing, and plumper while growing. This demand led to the development of the Wyandotte type. That type as finally standardized was not widely in evidence in the earliest Wyandottes. It was the novelty of their color, their slightly smaller size, earlier maturity and general excellence as layers that brought them into favor. The chunky, blocky body was not the prevailing type for a long time, and even to the present day wide variations from it are often noted in stocks not carefully bred for correct type. Similar variations occurring in Plymouth Rock stock, it often happened that specimens of one of these breeds were rather pronouncedly of the type of the other; and at times the intermediates—from both breeds—that were much alike in type, and not distinctively of either one type or the other, were so numerous that it was commonly said that the only difference between them was the form of the comb—the Wyandotte having a small rose comb. So there was much confusion of types, though the correct types are unmistakably different, and each breed when bred to its standard type has adaptabilities which the other has not.

The Rhode Island Red presents another model of the general-purpose type which—as it has been standardized—is more of an egg type than either of the two last-mentioned breeds. Unlike them, the Rhode Island Red was a local breed developed as the common fowl of a section of Rhode Island and the adjacent part of Massachusetts. While it appears that the interest in red fowls

in this district began with a flock of that color produced from crosses of Asiatic fowls about 1854, the general stock of the district was a mixture of common stock with many breeds. It had a red color—which really ranged from buff to brown, and was in the majority of cases more or less mixed with black and white—established by the general practice of discarding hens that were not in this line of color, and of breeding almost entirely from males that could fairly be described as red.

The result of this practice was to make the Rhode

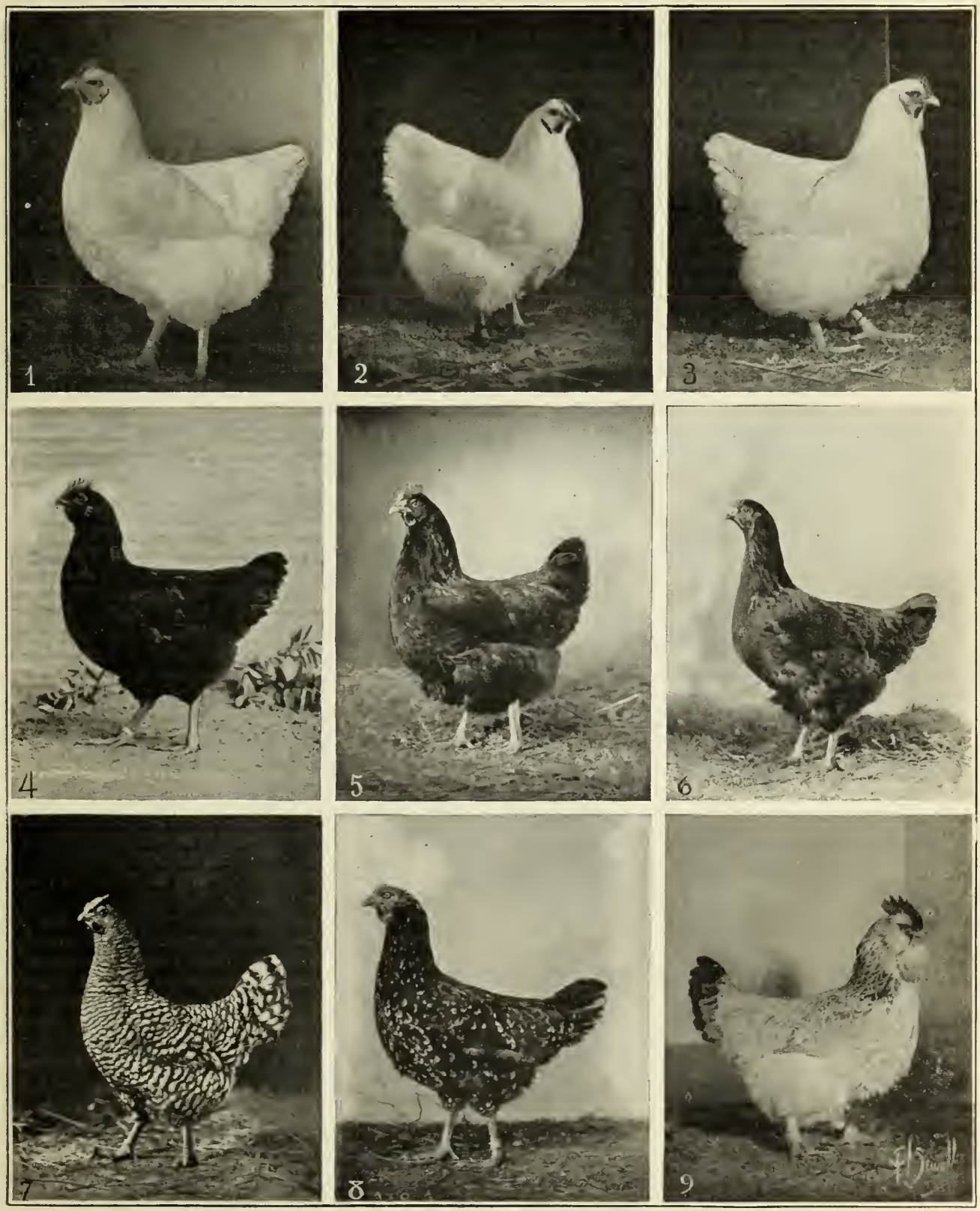


DUAL PURPOSE OR GENERAL PURPOSE TYPES OF FOWLS — MALES.

1—Plymouth Rock (White). 2—Wyandotte (White). 3—Orpington (White). 4—Rhode Island (Red, Single Comb). 5—Sussex (Red). 6—Buckeye. 7—American Dominique. 8—Java (Mottled). 9—Faverolles (Salmon).

Island Red a color breed—its only definite breed character being a crude and uneven red color of plumage. There was not only no uniformity of body type and size in the breed, or even in most of the separate flocks, but single combs, rose combs and pea combs, and all the possible intermediate forms that might come from indiscriminate crossing of the different forms of comb might be found in almost every large stock.

In making standards for breeds the first thing is to determine the body type of the fowl. Standard making



DUAL PURPOSE OR GENERAL PURPOSE TYPES OF FOWLS — FEMALES.

1—Plymouth Rock (White). 2—Wyandotte (White). 3—Orpington (White). 4—Rhode Island (Red, Single Comb). 5—Sussex (Red). 6—Buckeye. 7—American Dominique. 8—Java (Mottled). 9—Faverolles (Salmon).

proceeds on the general maxim that: "Shape makes the breed, color the variety." This rule is not always rigidly and logically followed, but departures from it are usually accidental rather than deliberate. To become a standard breed the Rhode Island Red, which for half a century before it was admitted to the Standard had been a color breed, had to become a shape breed. The applicants for its admission (the Rhode Island Red Club) had to agree upon some specific type which they would request that breeders of all breeds would recognize as the Rhode Island Red type. The type they selected not only had to be one that suited them, but had to be a type different from that of any other breed in the Standard. There have been a few cases where a breed was standardized with a shape description substantially the same as that of a breed previously recognized, but these were cases where the claimed facts as to the origin of a breed were construed as evidence that, though like in form, it was of an entirely different origin from the breed previously recognized. In the Rhode Island Red case there were no grounds for this. It was simply a matter of standardizing that one of the many promiscuous types which the breeders of Reds preferred, and which those who were to pass upon the question would admit was plainly of a distinctive type.

The selection made was a type that in comparison with others of the class may be described as "spare" rather than full in width of back and body, with a little of the same spareness in depth of breast and body. Such a type is not as prone to put on fat as the fuller-formed breeds in this class, which accounts for the fact that standard Rhode Island Reds are generally profitable layers and breeders for a year or more longer than most stock of the other breeds of the same general type. Seen in profile a typical standard Rhode Island Red appears about the same size as a standard Plymouth Rock, yet its weight is only that of the standard Wyandotte—a pound less than the Plymouth Rock. Though of the same weight as the Wyandotte the Rhode Island Red is of very different type, having none of the blockiness which is so pronounced in a Wyandotte of good type.

In the American Dominique, the Java and the Buckeye we have three other variations of the general type made to give distinctive breed character and type to races possessing characteristics which it was desired to perpetuate. The Dominique and the Java are modifications in different directions of the Plymouth Rock type, the present standard Dominique going considerably farther from it in one direction than the Java does in the other. The Dominique before the advent of the Plymouth Rock could be described as a color breed—not a local color breed, as the Rhode Island Red was, but any bluish gray barred fowl was called a Dominique, or perhaps cuckoo marked, or hawk colored. There were Dominiques of Hamburg type, Dominiques of Dorking type, and of all types between. As the early Plymouth Rocks were classified at shows with Dorkings, so they were quite generally bred in the yards with Dominiques, and a large proportion of the prominent early advertisers of Plymouth Rocks were also breeders of Dominiques. These Dominiques, of course, were nothing but rose-combed Plymouth Rocks, though breeders of Dominiques exclusively mostly had stock more of the Hamburg type. The older stocks of this character, however, completely disappeared from public notice for many years, and it was only about ten years ago that the movement to popularize a distinctive type of the Dominique began. The body type is really an intermediate between the laying and dual-purpose types, but in temperament, in the character of broodiness, and in adaptability to table purposes the Dominique is more akin to the general-purpose class.

The Java would be supposed from its name to be an Asiatic breed, but while there is no doubt that Black Cochins were frequently called Black Javas in early times, and that any large black fowl might be called a Java, by inheritance as well as in type, the modern Javas are near kin to the Plymouth Rocks. They are of the same standard weights, but less compact in form, having much of the Rhode Island Red type, but in a larger size. The Buckeye is a modification of the general-purpose type in the direction of the game type, and was originally a pea-combed Rhode Island Red. With respect to these three breeds, Dominique, Java and Buckeye, it is debatable whether it would not be better policy for all concerned to make the features in them which their admirers prize, variety or subvariety characters of the breeds to which they are nearest kin. While they have distinctive body type it is not in any case so different from others that there are special advantages in it as in some of the other models of the general-purpose type.

Besides the six American breeds mentioned, three breeds of foreign origin have the same general characteristics—the Orpington, the Sussex and the Faverolles. The Orpington is a modern English modification of the type of our American class, devised by its originator as a more desirable type for England, when the Plymouth Rocks and Wyandottes seemed in a fair way to become as popular there as they are in America. The type is not a duplicate of any American type, but is larger, meatier and heavier than the Plymouth Rock; with the rounded form of the Wyandotte rather than the long lines of the Rock, or any suggestion of Dorking shape. This is the standard type, though it must be recognized that, as a matter of fact, the greater proportion of indifferently bred Orpingtons are somewhat on the Plymouth Rock type, and some are rather more lightly built than average Plymouth Rocks. The several color varieties of the Orpington were made in different ways, but in at least two of them the blood of the survivors of the long-neglected "Old English stock" which was the prototype of the whole class was used.

After long obscurity this type "came back" to recognition in its own right with the popularizing of the Sussex fowls. While the type is an old one restored, it would appear that the old stocks have been more or less mingled with Asiatic blood, or with the blood of breeds having some Asiatic blood in their composition. This, however, is not a vital matter, as will appear when the phenomena of reproduction are discussed. The type does not present peculiarities of body structure adapting it especially to some purpose that can be met with it better than with any other breed type, and its popularity will obviously depend more upon the extent of the interest taken in it because of other features.

The Faverolles is a French breed in which table quality is more conspicuous than egg type, yet the two are so well balanced that the breed may properly be included in the general-purpose group.

The Meat Types

Breeds of the meat type are those in which quantity and quality of flesh are regarded as more important than egg production; that is, those who keep these breeds are influenced to do so primarily by their value as meat producers. It is a mistake, however, to suppose that the

breeds of this type are necessarily poor layers and incapable of high egg production. That they are generally poor layers under inexpert or indifferent management is indisputable; the evidence of that is found in too many cases of failure to get eggs from breeds of this type. But as a rule, the poultry keeper who cannot get eggs from a meat type cannot grow good specimens of that type for the table either. A poultryman skilled in handling fowls of the meat types can get very large egg yields from many of the hens, and much larger average production than the average poultry keeper gets from what are regarded as the best laying types, and are in fact the easiest from which to get high production.

The finest models of the meat types were developed in England and France. The English Dorking at its best is perfection in meat type—considering quantity, distribution and quality of flesh. It has, with the maximum of flesh, the minimum of bone and offal. The Houdan is a smaller breed of much the same type, though it should be said of Houdans as they have been bred in America in the last thirty years that we have had in them almost every type from an egg type to a fairly heavy meat type. The La Fleche and Crevecoeur, although described in the American Standard of Perfection, have rarely been seen in this country within the memory of the present generation of poultry keepers.

The Cornish, called in England the Indian Game, and known here by that name until quite recently, is a game type developed for flesh and size, which while still retaining to a pronounced degree the "mien" of a fighting game, has with added size and weight and from long breeding without reference to "game" qualities, lost most of the game characteristics. As a table type the Cornish occupies a peculiar position. While carrying a great deal of meat, the pure Cornish is usually too hard fleshed to make really good table poultry; and when bred, as some exhibition stocks are, to exaggerate as much as possible the massive lines of the type, the birds are apt to be abnormally coarse in bone with corresponding coarseness of sinew and muscle, and with coarse, thick skin. Such birds are of an extremely sluggish temperament—indifferent breeders and mostly very poor layers. In the writer's observation the type (in this pronounced form) is an exception to the general statement previously made that an expert poultryman can get good egg production from the meat types. All the cases he has known of good laying by this breed have been of flocks that could not be called correct standard type. The Cornish type, when not decidedly abnormal, is an especially valuable one for crossing with stock of other meat breeds that is lacking in development. It rounds out the carcass of the progeny, and the hardiness of flesh is greatly reduced.

The Asiatic meat breeds, the Brahma, Cochin and Langshan—especially the first two—have had, directly and indirectly, far more influence on the production of table poultry in America than the European breeds of this class. The general reason for this is that they are of far more rugged constitution, extremely hardy, and—provided they are well fed—will stand more exposure than any other fowls, while at the same time they respond more readily and more fully to high feeding under ordinary conditions. All these breeds are good layers when judiciously managed. The Langshan, the smallest and most lightly feathered of the three, might quite appropriately be classed as a general-purpose breed.

In the consideration and comparison of these Asiatic types, the effect of feather development upon the apparent outlines and type of the body must have special attention. In a breed that is very short feathered the plumage does not materially change or conceal the lines of the frame. As the length and density of the plumage increases it becomes of more importance in determining the outlines of the body, as they appear in the living specimens, and this results not simply from the difference in quantity of the feathers, but from their effect in concealing and obliterating the lines which are conspicuous in short-feathered birds. A Cornish fowl has the shape of body that it appears to have. A heavy-feathered, standard Cochin has not at all the shape of body that it appears to have, but when dressed is practically identical in shape with the Brahma, which in life and in full plumage has quite different looking outlines. In most breeds the Standard calls for a moderate development of plumage which will correctly suggest the lines of the body. In the exhibition Cochin the fancier-breeder working for a truly marvelous effect in plumage, so thoroughly "camouflages" the actual outlines of the body that only one familiar with the type both in life and after plucking for the table, can tell at all accurately at sight of the living bird what the shape of the body is.

This development of the Cochin has eliminated it from commercial poultry breeding, but in a study of poultry types the fact must be noted that in actual body type the Brahma and Cochin are practically identical.

Economically the Brahmas and Cochins, represented especially by the Light Brahma, are peculiarly adapted to the production of large roasting chickens and fowls. They have not, as a rule, as fine-grained meat as the Dorking, and a much larger proportion of their meat is in the legs, with correspondingly less breast meat. The quality of meat is a matter of selection. There are Brahmas and Cochins as fine grained in flesh and as juicy as it is possible for poultry to be, and in properly grown table poultry "white" meat is not so superior to "dark" meat that a discriminating taste will have any prejudice against the latter on the score of tenderness and palatability.

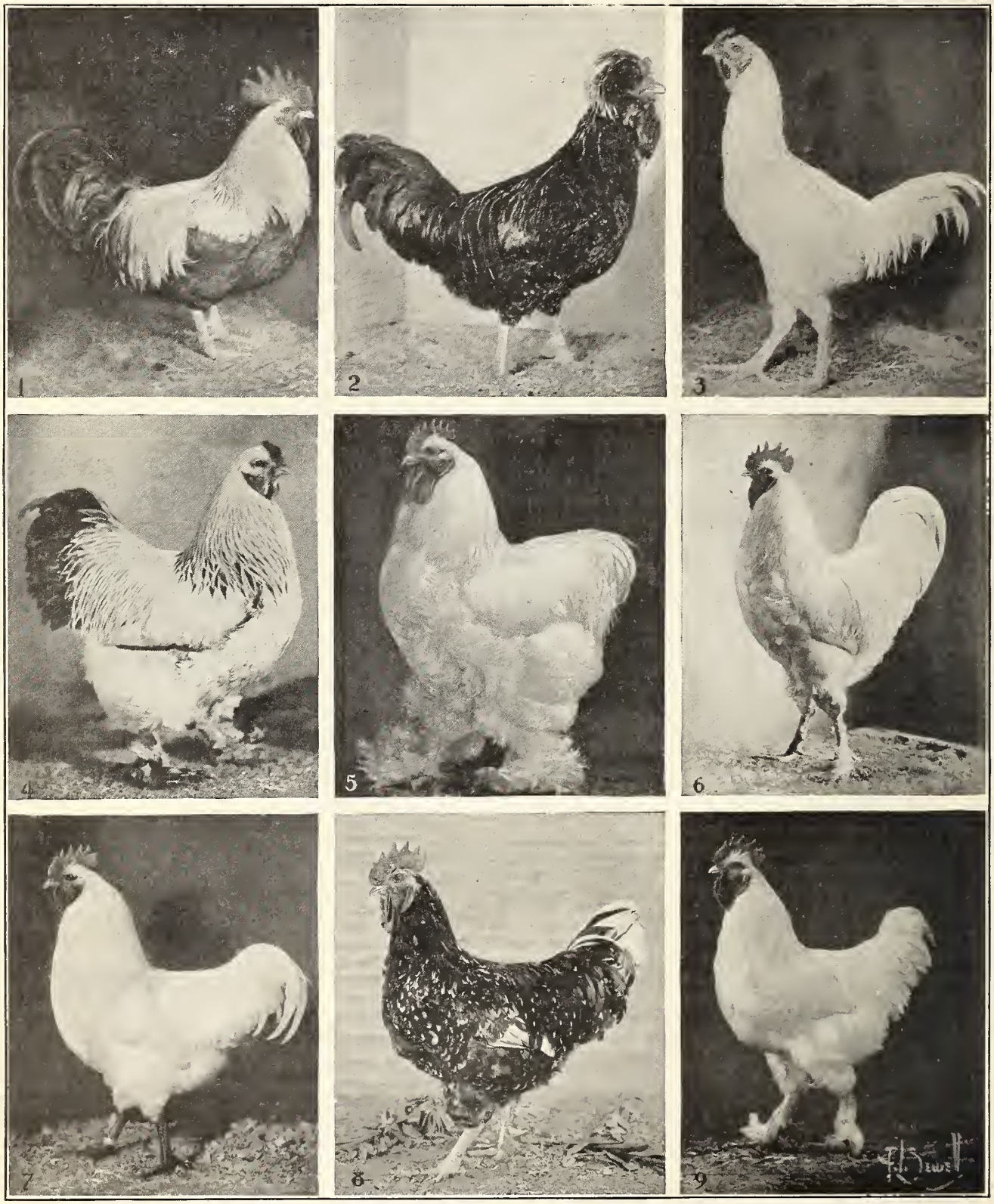
Color of Skin and Legs As a Breed Character

While color of plumage is a variety character, color of skin is a breed character. To some extent the color of the shanks and toes of fowls is correlated with the color of the plumage. This is natural, for the scales on the shanks are modified feathers. But the color of the skin of the body is generally independent of the color of the plumage. A black fowl may have a clear yellow skin where it is covered by feathers, but it is very unusual for such a fowl to have bright yellow shanks and toes. The color of these parts almost invariably is governed by the color of the plumage.

From the fact that the Leghorns, some Games, and nearly all Asiatic fowls as they were introduced here, had yellow skin and legs, it is quite reasonable to suppose that yellow skin and a tendency to yellow legs was the original character, and that the preference for white skin, and for flesh-colored and black or slate legs which arose in Europe was an outgrowth of familiarity with the colors which by some chance there became predominant. While European writers on poultry generally assert that the quality of meat is largely dependent on the color of the skin, that view is not admitted by those who have seen and tasted all grades of quality in poultry meat in every known color of skin.

It is the popular impression, and one that has been entertained by a good many breeders at times, that the

color of the skin, and especially the color of the legs and toes shows the purity of blood in a specimen; i. e., that it is not merely a breed character, but an index of quality of the stock. The fact is that the color is much influenced by the conditions of life of the birds, as well as affected to the extent indicated above by the color of the plumage, and that in all breeds there is a constant tendency for the color of the skin not regarded as typical of the breed to appear in some specimens. Hence, while systematically breeding to secure and maintain whatever color of skin and leg has been made the standard character in any breed, the poultry keeper ought not to be



MEAT TYPES WITH SOME GENERAL PURPOSE AND INTERMEDIATE TYPES — MALES.

1—Dorking (Silver Gray). 2—Houdan (Mottled). 3—Cornish (White). 4—Brahma (Light). 5—Cochin (White). 6—Langshan (White). 7—Rhode Island (White). 8—Sussex (Speckled). 9—Faverolles (White).

misled into thinking that faults in this character are more serious than they really are.

Combs and Crests As Breed Characters

The irregular manner in which breeds and varieties have been developed, and the differences in the circumstances attending their standardization—the changing personnel of the American Poultry Association, and changes in the ideas of members as to the best policy or plan in dealing with applications for the recognition of breeds—have led to some curious inconsistencies in the system of classification and division of breeds. In some breeds the

MEAT TYPES WITH SOME GENERAL PURPOSE AND INTERMEDIATE TYPES — FEMALES.

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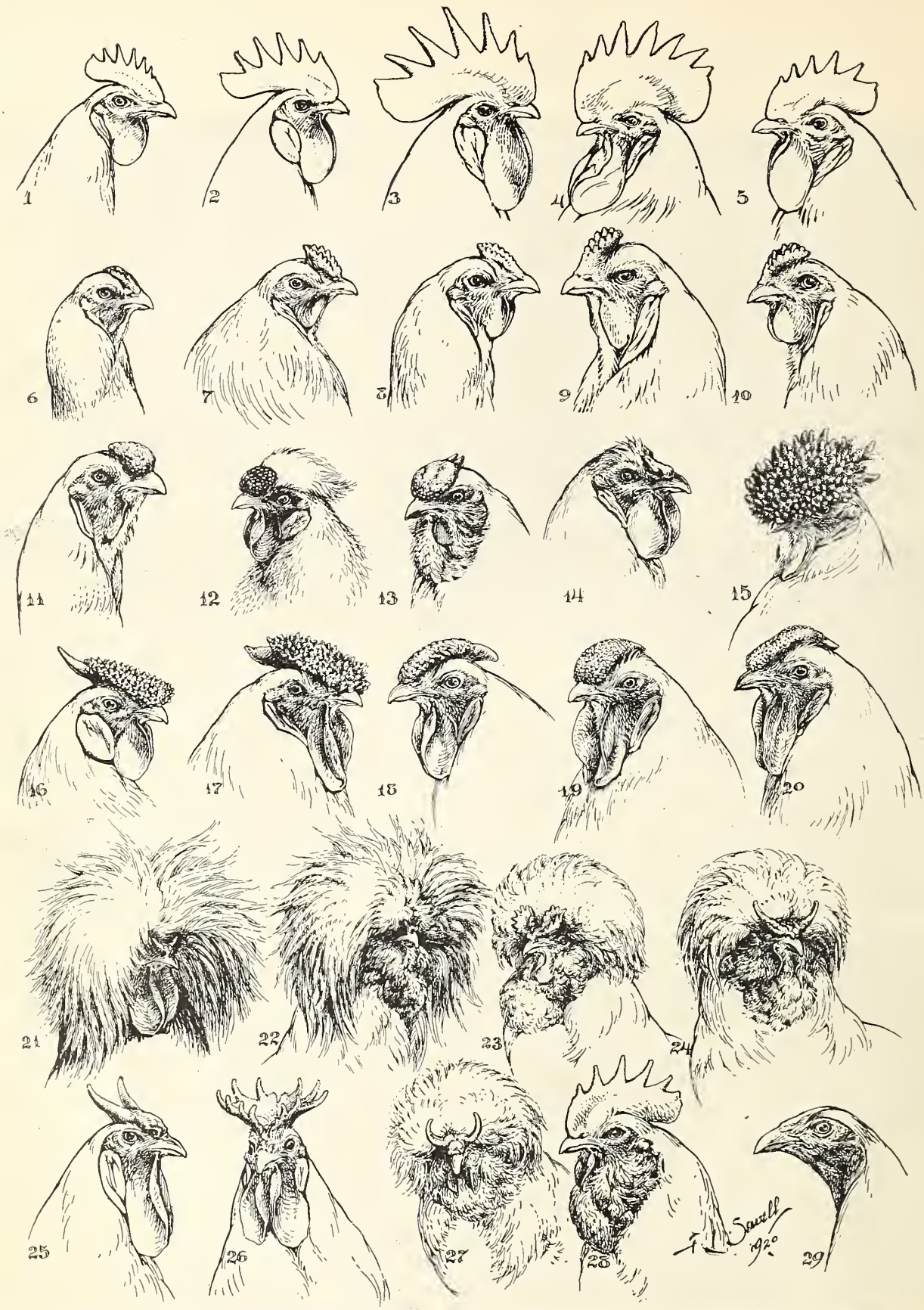


TYPICAL FORMS OF ORNAMENTAL APPENDAGES OF HEADS OF DOMESTIC FOWLS — MALES

TYPICAL FORMS OF ORNAMENTAL APPENDAGES OF DOMESTIC FOWLS—MALES

(See Chart on Opposite Page)

1—**Old English Game**—nearly the original form, single small comb and wattles, ear lobes, inconspicuous red.

2—**Modern Leghorn**—comb and wattles medium in proportion to size of bird, ear lobes large, white.

3—**Minorca**—Large comb and wattles very symmetrical, ear lobes large, white.

4—**Dorking**—Large beefy comb, wattles irregular, ear lobes rather small, red.

5—**Plymouth Rock**—rather small comb and wattles in medium-sized bird, ear lobes medium, red.

6—**Aseel**—very small pea comb, wattles rudimentary, ear lobes small, red.

7—**Sumatras**—small pea comb and wattles, ear lobes small, red.

8—**Cornish**—medium small pea comb, wattles and ear lobes. (red).

9—**Brahma**—small pea comb, medium-sized wattles, ear lobes large, red dewlap between wattles.

10—**Buckeye**—Medium pea comb, short wattles, medium ear lobes, red.

11—**Malay**—Small strawberry comb, very small wattles, and ear lobes (red).

12—**Silkie**—Small strawberry comb, medium wattles and ear lobes, comb and wattles purple, ear lobes light blue; small crest.

13—**Russian** (early about 1890)—comb small, intermediate between strawberry and rose and having double spike in rear, wattles very small, ear lobes very small (red) and concealed by small beard.

14—**Breda**—comb rudimentary rose, wattles medium, ear lobes small, white, rudimentary crest.

15—**Redcaps**—very large rose comb, medium wattles and ear lobes (red).

16—**Hamburg**—medium rose comb with spike inclining upward, medium wattles, ear lobes large, round, white.

17—**Dorking**—corresponding to 4 in single comb.

18—**Dominique**—medium rose comb and wattles, ear lobes small, red.

19—**Wyandotte**—low rose comb, rather long wattles and ear lobes (red).

20—**Rhode Island Red**—small medium rose comb, medium wattles and ear lobes (red).

21—**Non-bearded Polish**—comb V-shaped, very small, wattles medium, lobes small (white), crest very large.

22—**Bearded Polish**—Same as foregoing except beard, wattles very small or wanting.

23—**French Houdan**—Medium leaf comb, small wattles, medium crest, heavy beard, ear lobes small, white.

24—**Crevecoeurs**—Antler comb, very small wattles and ear lobes (red), medium crest and beard.

25—**La Fleche**—Large V-shaped, large wattles, ear lobes quite large, white.

HEAD OF BLACK SPANISH

26—**Buttercups**—Comb cup shaped medium large, wattles large, ear lobes medium, white.

27—**Sultan**—Comb small V-shaped, wattles very small, ear lobes small (red), crest large, beard full.

28—**Faverolles**—Comb single, medium-sized, wattles small, ear lobes small (red), beard full.

29—**Old English Game**—(Same as No. 1 dubbed).

30—**White-Faced Black Spanish**—Large single comb and wattles, ear lobes enormously developed, making the large white face.

This series of illustrations shows that there is no necessary correlation between the different features and that any combination or degree of variation in different characters can be made, subject only to the physical impossibility of two characters occupying nearly the same position being both very large.

type of comb is regarded as a breed character. Thus single comb is characteristic of Plymouth Rocks, and rose comb of Wyandottes, while in Rhode Island Reds both types of comb are recognized and the comb is made a variety character. In various other breeds, as the Leghorns, where color determines the variety, the form of comb becomes a subvariety character. These things are merely matters of form, yet they are often confusing to those not acquainted with the circumstances, and in a measure misleading. For instance, where it is asserted with an assumption of authority that the single comb is an essential feature of Plymouth Rock type, and excludes every other form of comb, the impression is given that there is an essential correlation between the Plymouth Rock type of body and the single comb, while the fact is that the exclusion of other types of comb is purely arbitrary. It is the privilege of those who fix standards to be arbitrary in such matters, as long as their attitude accords with the general sentiment of those interested; but in studying types with relation to the principles of breeding, all such points must be placed in their true relation to the subject.

The incompatible things in type are what may be called the "mutually exclusive" superficial characters. Thus we cannot put large combs and large crests on the same birds, nor well-developed wattles on bearded birds, or vice versa; but small combs and wattles and small crests and beards may be produced together, with the result, as a rule, that neither is at all attractive. It is possible to make almost any combination of superficial characters that can be conceived of, within the limitations mentioned, and if enough persons want a certain thing standardized, it will eventually be done.

American breeders generally attach much more importance to moderate size, neatness and symmetry in combs, than others. Their constant effort is to produce combs that will not be in themselves too conspicuous, but will appear symmetrically proportioned to the size, type and style of the bird. Exaggerations of any feature are generally abhorrent to them, many carrying this antipathy so far that they fail to find the really valuable lessons that breeding to extreme developments has for all students of the problems of breeding.

Concerning Further Multiplication of Breeds

The Standard breeds of fowls we now have make a list which to casual consideration seems to contain every type that can be of service for any purpose. So it would appear that there is no occasion for the making of new breeds and little prospect of interesting people in them. But the history of poultry culture in America shows the successful introduction and promotion of new breeds is only in part governed by the apparent need of them.

The opportunity for a new breed comes whenever one or more popular breeds begin to decline in favor, as even the most popular do from time to time. Then the masses of poultry keepers are easily interested in something new, the promoter of a new breed gets their attention, many take it up, and if it has sufficient merit and is persistently advertised it will make a place for itself in competition with the old breeds of the same general class.

The general effect of the addition of a new breed to a class is to make breeders of all breeds in that class pay more attention to correct breed type. The result is in reality just the opposite of what those not familiar with poultry history think it should be logically. Thus, when some twenty to twenty-five years ago Plymouth Rocks and Wyandottes were the two popular breeds in the gen-

eral purpose class, and the ordinary stocks of these breeds were of the same variable types, there was quite an insistent popular demand that a common Standard type be established for all the breeds of this class—that they be merged into one breed, with the necessary divisions into color varieties, and comb sub-varieties.

Such a movement however logical it might appear, would be directly contrary to the trend of development of Standard breeds. Its effect was not to convince breeders that their ideas of distinct breed type were wrong, but to impress upon them that they were not giving proper attention to breed type. So they began to give more care to making breed type distinctive. In doing this they limited the adaptibility of these breeds and made places for the Rhode Island Red and Orpington.

The whole tendency of breeding to fixed and highly finished types is toward the creation of a distinct breed for each special purpose and for peculiar climatic or soil conditions. Breeds so produced may not at first have truly distinctive breed type, but in time breeders will come to agreement upon one, as in the case of the Rhode Island Red mentioned on page 22.

The multiplication of breeds leads to further refinement of breed types and the refinement of breed type stimulates interest in new breeds, or revives interest in old ones that have been neglected. Many so-called new breeds are only modifications of old ones, and it is a most interesting fact that no matter what the promoters of a new breed may make its Standard description, it will tend toward

GROUP TO SHOW DIFFERENT FORMS OF TAIL DEVELOPMENT — MALES.

1—Hamburg (White). 2—Campine (Golden, Belgian). 3—Campine (Silver, English). 4—Yokohama (Gray). 5—Cochin (Black). 6—Cornish (White Laced Red). 7—Japanese Bantam (Frizzled). 8—Rumpless (Bantam). 9—Exhibition Game Bantam (Red Pyle).

either the type of an old breed which it has displaced or to take the type best suited for the practical purpose for which it is most used.

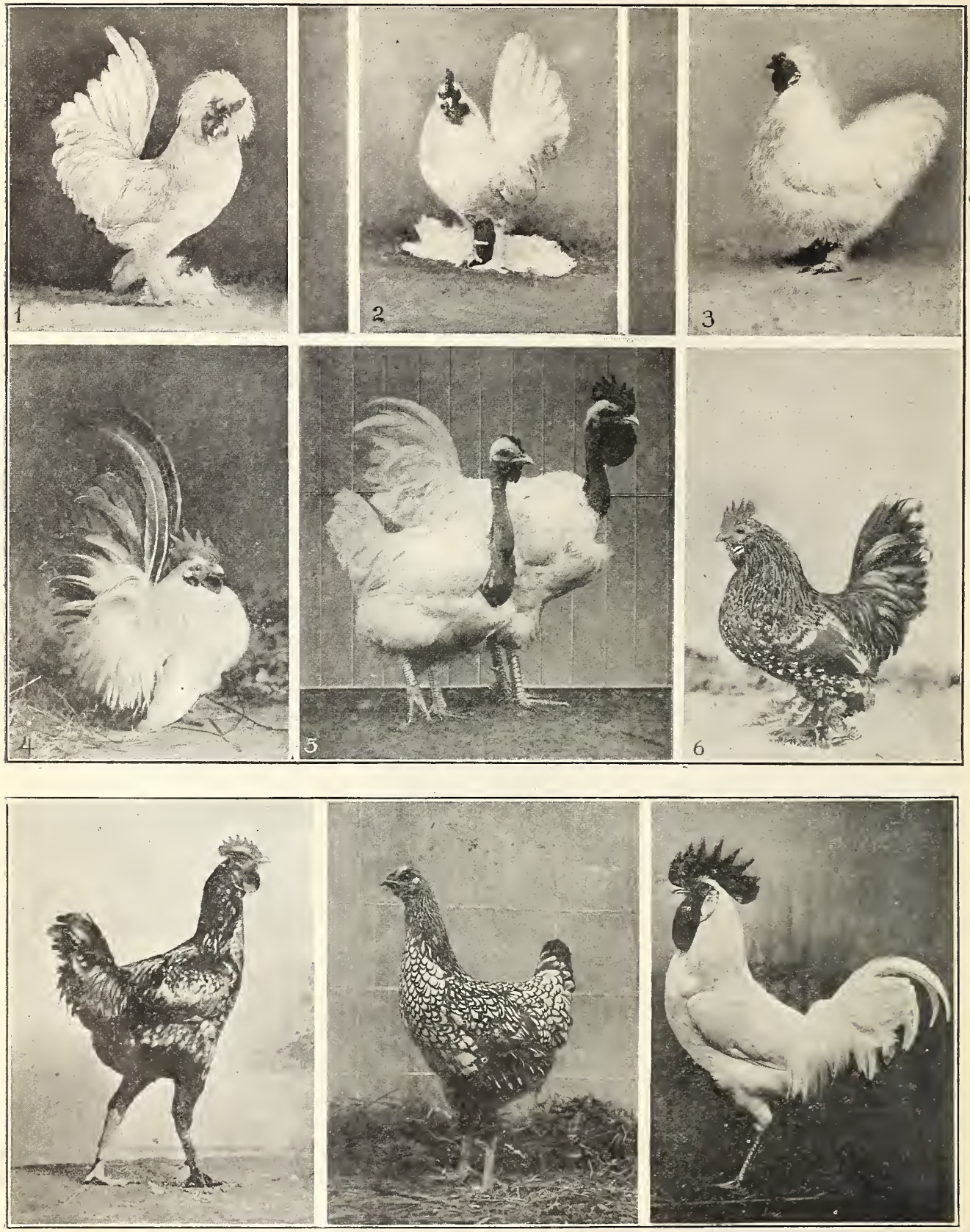
Thus Orpingtons were first produced as direct competitors of Plymouth Rocks and Wyandottes, but instead of displacing these they took the place of Asiatics, particularly of the Buff, Black and White Cochins which almost disappeared. In effect they met the demand for a fowl of the Cochin type of more moderate feather development and without feathers on the feet. It is because the Orpington type appeals to the taste that formerly fancied Cochins that so many judges and breeders favor birds with profuse plumage and short legs.

Another case in point is that of the Jersey Black Giant, a type designed to exactly meet needs which the Black Langshan met in everything but color of skin—a most important point in a table fowl for the American market when poultry is handled in quantity.

The Black Giant, while a new breed, in many points resembling the Langshan, has its direct prototype not in that breed but in the large cross-bred fowls of black and other dark colors which for many years before this breed was produced were grown in New Jersey and eastern Pennsylvania for Philadelphia chickens. Most of these latter had much Cochin blood and were heavily feathered. The heavy plumage was not objectionable for winter chickens, but was a disadvantage to breeding stock carried through the summer in that climate, so on the whole the new breed is better suited to its purpose than the cross-bred stock.

GROUP TO SHOW DIFFERENT FORMS OF TAIL DEVELOPMENT — FEMALES.

1—Hamburg (White). 2—Campine (Golden, Belgian). 3—Campine (Silver, English). 4—Yokohama (Gray). 5—Cochin (Black). 6—Cornish (White Laced Red). 7—Japanese Bantam (Frizzled). 8—Rumpless (Bantam). 9—Exhibition Game Bantam (Red Pyle).



GROUP OF NOVEL POULTRY TYPES

1—Sultan (male). 2—Booted Bantam (male). 3—Silkie (male). 4—Japanese Bantam (male). 5—Naked-Neck Fowls (male and female). 6—Mille Fleur Bantam (male).
Lower—Exaggerated types of Black Langshan, Silver Wyandotte and White Leghorn as bred in England.

CHAPTER III

The Colors and Color Patterns of Fowls

Color Pattern of the Original Species—How the Numerous Colors And Markings in Standard Varieties Were Produced From It—Phenomena of Development of Color Patterns Which Determine Principles of Breeding—Systematic Double Mating an Inevitable Result of Efforts to Secure Perfection in Color—Relation of Under Color to Surface Color in Breeding

AS the color of the plumage of poultry in no way affects growth or production, it is popularly supposed that matters relating to breeding for color do not materially concern any poultry keepers but those who breed for color points. Poultry keepers whose interest in the subject is limited to the production of market eggs and poultry are rather inclined to take the position that the problems of color, and especially the fine points of color breeding, mean nothing to practical men and women. Many of them even go farther and refer to an interest in breeding for excellence in color and superficial shape characters as "fancy" breeding—something in the line of sport rather than of serious, worth-while-in-itself occupation. This attitude shows a lack of insight into the most elementary matters related to breeding for definite and permanent results.

B. M. BRIGGS
Originator of White and Columbian Wyandottes

No one trying to breed poultry and maintaining an attitude of indifference to beauty and quality in color ever gets far in breeding the more substantial characters that are of direct and prime interest to him. It may not be impossible for one who takes no interest in characters that appeal only to the eye to have fine conceptions of the points of form and symmetry that make type, and that are also the expression of substance, constitution and vitality; but it is a matter of wide observation that poultry keepers of that class do not show discriminating judgment in the points that are most important to them, nor do they give in their breeding work evidence of any comprehensive knowledge and useful understanding of the laws of inheritance and the principles of breeding. There are two reasons for this: one in the human faculty, the other in the nature of the facts in the case.

It needs but little close observation of the judgments of poultry keepers discussing or appraising the characters and qualities of poultry to show that most persons are better judges of color than of form. They see faults in color more quickly, and will note a degree of fault in color when they would not note a like degree of departure from correct symmetrical lines of body conformation. The average person interested in poultry does not begin to show any discerning judgment in matters of form and type until after he has attained some proficiency in judging color values, and until he is called to pass upon the merits of specimens so nearly alike in color that the decision between them must be made upon shape points. That is the human side of the question.

On the poultry side: plumage color is perhaps the most valuable of all characters to show the operations of the laws of inheritance, because, while the fine points in quality of color are more or less influenced by feed and conditions, the general color tones, and the distribution of colors, are not. The color pattern is in no way affected by anything that the poultry keeper may do or fail to do in such matters as care and feeding; but the size and shape, and the carriage of body, and all the points that determine its type, can be much affected by the diet, the methods of feeding, the conditions of life, and sometimes even by single events of life.

To the student of matters relating to poultry breeding, therefore, everything relating to color has an educational value. To undertake to master the principles of breeding in terms of shape and production exclusively, giving no attention to color, is much like trying to learn algebra before one has a working knowledge of common arithmetic.

The Color of the Original Species of Fowl

It is held both by those who dissent from the theory that the Gallus Bankiva is the original species, and by those who accept it, that the original color was similar to that of the varieties which are called brown, or partridge colored—technically described as of the black-red, or brown-red type of color and markings. The hyphenated term specifically refers to the color of males, which have a black (or nearly black) or brown breast and body, with the plumage of the neck, back and saddle red, the tail being black—often more or less tinged with red or brown. The females are brown, except that the main tail feathers may be black, and so may some of the flight feathers in very dark colored specimens. The brown of the females is not a solid color, but in nearly all sections is of two shades, the lighter shade or ground color being marked with patterns of the darker shade in various forms,

In specimens not bred to some distinct color pattern, the markings are usually very irregular, different patterns will be found in all sections, and sometimes bits or suggestions of different patterns on the same feather. Even in highly bred standard specimens it is almost always possible to find in the defectively marked feathers in the various sections bits or suggestions of all the kinds of

markings that are found in the plumage of fowls. The chicken plumage of the males is like that of the females. Both the peculiar development of the form of the ornamental male feathers and the separation of the colors which sends the black to the underparts of the body, and the red to the "top" sections, come with sexual development and the growth of adult plumage.

Brown-red has been made a standard color combination only in one variety of Exhibition Games, and even in this the term is rather a misnomer—a convenient short term rather than an accurate description. A brown-red proper is what might be called a low-grade black-red—one in which the black sections contain so much red that the effect is brown, and not black. There are black-red

GROUP SHOWING VARIETIES IN BLACK AND WHITE COLOR PATTERNS — MALE

1—Barred Plymouth Rock. 2—Silver Campine. 3—Silver Penciled Hamburg. 4—Silver Laced Wyandotte. 5—Bearded Silver Polish. 6—Silver Spangled Hamburg. 7—Dark Brahma. 8—White Crested Black Polish. 9—Lakenvelder.

varieties in every class of fowls and sometimes in every breed in the class, but the details or markings are not the same in all.

Standard Black-Red Patterns

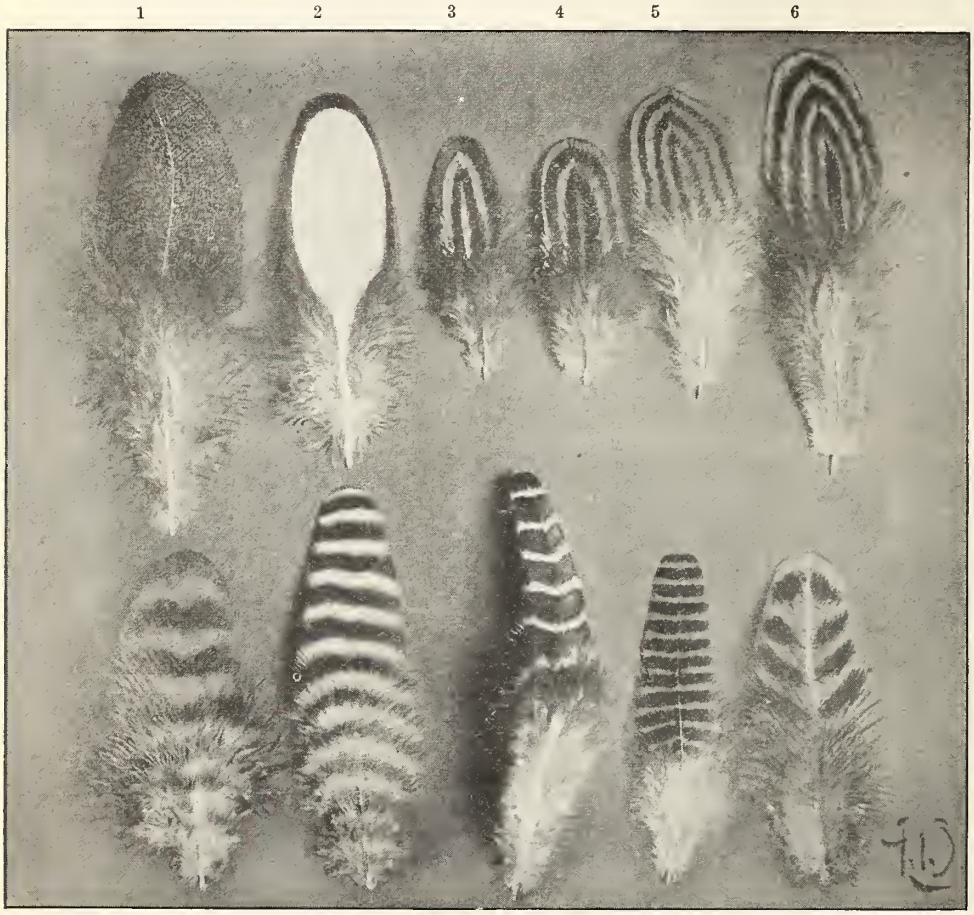
The Brown Leghorn is the most widely known variety of this color type. In the standard male the breast and body, the tail, and a part of the flight feathers of the wings are black; the neck and back (including the wing bows which are a part of the back as it appears when the bird is at rest with folded wings) and the saddle being a rich dark red. The long slender feathers of the hackle and saddle have a longitudinal black strip down the middle of the feather. In males that are not well bred and carefully selected for these color characteristics the black

GROUP SHOWING VARIETIES IN BLACK AND WHITE COLOR PATTERNS—FEMALES

1—Barred Plymouth Rock. 2—Silver Campine. 3—Silver Penciled Hamburg. 4—Silver Laced Wyandotte. 5—Bearded Silver Polish. 6—Silver Spangled Hamburg. 7—Dark Brahma. 8—White Crested Black Polish. 9—Lakenvelder.

sections are more or less splashed with red, the red of the different top sections is not of the same shade, and the striping in hackle and saddle is apt to be poor. In fact, this striping is sometimes lacking in males that are of most excellent color in every other respect.

Except as stock is well bred to eliminate it there is always some white in birds of this color, either in the undercolor, or in the neck, or at the base of the tail, or in the tail and flight feathers. Traces of white in these places are also likely to appear in the best bred stock when grown under conditions not fully favorable to the finest development of the color.



SERIES SHOWING DISTINCT COLOR MARKINGS ON FEATHERS OF FOWLS

(Continued on page 35)

1—stippling, as on Brown Leghorn; 2—lacing, as on Laced Wyandotte; 3—double penciling with the outer line a lacing, found on small penciled feathers; 4—common form of double penciling as on Dark Cornish; 5—triple penciling, as on Dark Brahmas; 6—quadruple penciling—imperfect in the fourth (inner) line; 7—coarse, uneven barring as in early Plymouth Rock; 8—distinct even barring of the modern Plymouth Rock; 9—wide dark barring of the Campine; 10—narrow straight barring of the Penciled Hamburg; 11—divided V-barring as on many Buttercups at present stage.

The neck hackle of a standard Brown Leghorn female is a golden brown with a dark stripe, the back and all other visible sections, except the main tail feathers, which as previously noted are black, and the breast, which is a salmon color, are of light brown, stippled with fine dots of darker brown, but on the flight feathers of the wings and on some of the tail coverts, where the darker shade predominates, the effect is of light stippling on a dark ground.

In the standard varieties of the black-red color type that are called "partridge" or golden penciled, that character of markings is characteristic of the females. The males are virtually the same in color pattern as the Brown Leghorn males, with only a few slight differences in details of markings. There is no marked difference in the markings of the males such as it would be supposed would occur when the females are developed with such different color patterns. The penciling of the females is a series of three lines of the darker shade of color conforming to the outline of the feather. The beauty of the pattern is in the uniformity and distinctness of this penciling. It extends to every section of the plumage, but in the neck there is a form of reversal of the relations of the two shades of color, the black stripe in the hackle being slightly penciled with brown.

The females in the partridge varieties are of a darker, richer color than the Brown Leghorn females. The ground color is described as a mahogany brown, and the dark color as black, but these descriptions are realized only in the most richly colored specimens. The dark color is usually a very dark brown, and the light a warm shade of brown that has not the rich effect of the fully-up-to-standard shade. In poor-colored specimens the light shade often degenerates into rather dark mealy buff, and the dark becomes a medium dingy brown. Very handsome hens are seen in shades too light for the Standard when the markings are clearly defined, the colors clean, and sufficiently contrasted to give distinctness in markings. The breasts of the females of this color type are penciled like the rest of the body.

The Dark Cornish presents a still darker example of the black-red type. In the male the red in the top sections is so much reduced that it appears only as shafting on the quills of the feathers, and as a slight intermixture with the black of the web of the feather. In the female, too, the colors are quite dark. and the number of pencilings on each feather is two instead of three. When the Cornish began to be bred in America as Indian Games in the early nineties, some were bred with triple lacings, following the fashion of the Partridge Cochin; but it was at once noted that the triple-laced pattern appropriate to the long wide feathers of the Cochin did not look so well on the shorter and narrower feathers of the Indian Game. There was not room on them for three distinct lines following the contour of a feather, and the effort to establish triple lacing gained few adherents and was promptly discontinued by most of the breeders.

Considering only the varieties so far mentioned, it

would appear that the sections in the male which are red in the primary color pattern would change only in unison. But when we turn to the variations of the black-red pattern that have been made in Campines, Hamburgs and Polish, it appears that there is no necessary correlation of pattern in different sections, and that the pattern may be broken up and rearranged in any way that may be desired. In the Golden Campine the characteristic markings of the feathers of the hen have been established in every section of the cock; but in both sexes the neck has been made clean in color, all of the black or dark color having been eliminated except that faint traces of barring at the lower edge of the hackle are common. In the Golden Penciled Hamburg the penciling is not laced penciling as in the partridge varieties, but is bar penciling in parallel lines across the feathers. This character of marking extends to every section of the female plumage except the neck hackle, which is of the ground color and clean; but in the male the dark color is eliminated to such an extent that it appears as a bay or red fowl with only a little penciling on the thighs, and with the dark color only in these markings, in the fluff, and in the wings and tail where the usually black feathers have lacings or edgings of bay.

In the Golden Spangled Hamburg the black in the feather is all collected in one spot or spangle at the tip, and the marking is the same in both male and female, but with the shape of the spangle changing in some sections to suit the form of the feather. In the Redcap there is a similar general color pattern, but with the colors much darker, and the spangle in a different form. In the Golden Polish the dark color is in the form of a single lacing all around the edge of the feather, and the markings extend to every section of both sexes. In the Golden Wyandottes the males have bodies laced like the plumage of the hen, while the hackle, back and saddle sections are like the Brown Leghorn, Golden Penciled Wyandotte and other varieties of that type.

The laced Wyandotte female differs from the laced Polish in the neck hackle, wings and tail, the Wyandotte having the dark color in these sections where the Polish has light color; the wing flights being nearly black, and the main tail feathers black, where these sections are nearly bay in the Polish; and the hackle of the Wyandotte being bay with a black stripe in the center, while that of the Polish, like the rest of its plumage, is bay with a black lacing around the edge.

In the range of black-red combinations described we have the nearly self-colored Golden Penciled Hamburg male at one end of the series, and the very dark, nearly black Cornish male at the other, and between these a variety of different arrangements of the color patterns in the various combinations of male color. In the females we have a variety of distinct markings established as race characteristics where originally there was simply a miscellany of fragments of all patterns.

The Black-White Color Types

The simple absence of the brown, bay or red that is commonly the ground color in black-red combinations gives a fowl with corresponding dark markings on a white ground. In these combinations black remains black, but the gradations from black through brown and bay to red are replaced by gradations of gray; and either as a result of the toning down of the black where the color is dark, or as an effect of the joint impression of the black and white intermixed in the lines of the pattern upon the eye, the color as a whole will appear gray or silvery. Most of the brown and golden varieties mentioned have their silver counterparts, but a few have not. In one case (that of the Partridge Cochin and Dark Brahma) the method of classification and the effect of considering comb as sometimes a breed character put the counterpart in another breed. There are also cases of black-white varieties having no black-red counterparts.

In Leghorns the comparatively little known Silver

SERIES SHOWING DISTINCT COLOR MARKINGS ON FEATHERS OF FOWLS

(Continued from page 34)

12—white; 13—white slightly ticked with black; 14—white with black increased making a stripe; 15—heavier stripe dividing at the base, found especially in saddles of males with heavily striped saddles; 16—mottling, white tip as in Ancona; 17—spangling, regular dark spot on light ground, as in Spangled Hamburg; 18—double spangle or combination of spangling and mottling, as in Speckled Sussex; 19—edging of white or light color on black or dark wing primaries; 20—white or light color on one side of quill or black or dark wing secondaries; 21—black.

Leghorn corresponds to the Brown Leghorn in the black-red color. It is interesting to note with respect to this type and other silver types that have the stippled plumage, that, while the red that makes the brown in other sections of the plumage is eliminated, the red that makes the salmon in the breast is not, but the salmon breast is retained slightly modified by the absence of other red from the feathers. The Silver Duckwing Games have the

GROUP SHOWING VARIETIES IN BLACK AND RED COLOR PATTERNS—MALES

1—Partridge Cochin. 2—Rose Comb Brown Leghorn. 3—Golden Penciled Hamburg. 4—Dark Cornish. 5—Golden Laced Wyandotte. 6—Golden Spangled Hamburg. 7—Rose Comb Rhode Island Red. 8—Buttercup. 9—Bearded Golden Polish.

same color, including the salmon breast on the female. So has the Silver Gray Dorking which has no recognized black-red counterpart among standard races or in existing stocks, the so-called Red Dorking, which was of the black-red type, now being unknown. The Colored Dorking appears in an analysis of varieties on the basis of color as a very dark gray Dorking in which so much red still remains that the dark color is brownish in the fe-

GROUP SHOWING VARIETIES IN BLACK AND RED COLOR PATTERNS—FEMALES

1—Partridge Cochin. 2—Rose Comb Brown Leghorn. 3—Golden Penciled Hamburg. 4—Dark Cornish. 5—Golden Laced Wyandotte. 6—Golden Spangled Hamburg. 7—Rose Comb Rhode Island Red. 8—Buttercup. 9—Bearded Golden Polish.

males, and the top sections of the males are straw colored. In a less marked degree the Golden Duckwing Game stands in the same relation to the Silver Duckwing.

The Silver Penciled Wyandotte, Silver Penciled Plymouth Rock, Silver Laced Wyandotte, Silver Campine, Silver Polish, Silver Spangled Hamburg, Silver Penciled Hamburg, are all identical in color with the corresponding golden varieties, except that they have white ground color instead of one or more shades of bay or brown. The silver counterpart of the Partridge Cochin is found in the Dark Brahma. This is explained by the fact that the Brahmas and Cochins as they came to America and Europe from Asia were not separate breeds, but all were of the general large Asiatic meat type—a breed of various colors and having both single combs and pea combs. The Cornish of the black-red type has no silver counterpart—a lack which an enterprising and ambitious breeder could gain fame by supplying.

As the salmon breast is retained in the silver varieties with stippled plumage, so traces of red remain in the gray and black of the silver-penciled varieties. Females, in particular, that are free from it are extremely rare. Many finely marked females have so much red that the suspicion is aroused that an outcross with the corresponding black-red variety has been made to intensify color; but leaving these cases out of consideration, a reddish cast to the dark color of these silver varieties is so common that the greater part of it must be accounted for on the ground of recent separation from the black-red variety.

The All-Barred Color Pattern

From familiarity with the Barred Plymouth Rock and the Dominique, poultry keepers have become accustomed to consider barring all over the specimen as an intermediate form of black and white, and as a development due to combination of solid black and pure white. But it has been shown that in the black-red type there are females with fine barring in the greater part of the plumage in varieties in which the males have only a little suggestion of that pattern, and in another breed both males and females all barred except the neck hackle; and it has further been shown that, by the simple failure of the red element to appear, black-and-white varieties with complex and highly finished silver varieties may be evolved from partridge, brown, or golden varieties. This is a much simpler and quicker mode of producing barred-all-over "gray," "silver" or "blue" color varieties than to wait for the gradual development of all black specimens to mate with the white specimens which, as is generally known, may appear in animals or birds of any color at any

DARK BROWN LEGHORN FEATHERS

1—male wing secondary; 2—male wing primary; 3—female wing secondary; 4—female wing primary; 5—male neck hackle; 6—female neck hackle; 7—male breast; 8—female breast; 9—male wing shoulder; 10—female wing shoulder; 11—male wing bar; 12—female wing bar; 13—female tail proper; 14—male tail proper; 15—male back; 16—female back; 17—male saddle; 18—female saddle; 19—male covering body (growing from thigh); 20—female covering body; 21—male sickle.

time, simply as the result of an entire or nearly total absence of pigment.

There is nothing at all mysterious about the origin of barring when all the types of markings found upon feathers are considered in the light of the fact that between types or patterns of markings which are perfect of their kind there are in imperfect examples all forms of intermediate patterns. A single line, stripe or penciling of dark color on the light ground of a feather, if it takes symmetrical form, must either make a stripe in the center of the feather or a lacing following the contour. It may be said with equal accuracy that the linear splitting of a central stripe, and the transposition of the parts toward the edges of the feather, gives rise to lacing, or that the recession of lacings at the edge of the feather and their final union makes a stripe in the center. In the standard descriptions of hackles the corresponding feathers in the hackles of Brown Leghorns and of the Partridge Cochins—the feathers being identical in pattern—are in the Brown Leghorn described as red striped with black, and in the Cochin as black edged with red.

It is significant also in this connection that the use of the term penciling to describe what is now commonly called barring is a survival of the days when it was necessary to place strong emphasis upon the specification that the bars on Penciled Hamburgs should not follow the outline of the feather but run perfectly straight across it. A comparison of double and triple-laced feathers will show that with the increase from two to three lacings the form of the pattern begins to change. The lines along the edges of the feather farthest from the tip become fainter, and the line across feather near the tip tends to become straighter. If the number of lacings is increased to more than three the specification that the lacing shall follow the outline of the feather cannot be met, for the feather is too narrow.

Whatever the number or character of the lines in the color pattern of a feather, they tend to arrange themselves in a symmetrical order. If the number is small they tend to follow the contour of the feather, but if the number increases so that the lines cannot run nearly uniform when following the contour of the feather, they will tend more and more to run across it. In all barred varieties the barring is a first crescentric. Fine, straight, uniform barring is secured not merely by breeding to get straight barring, but by making the numbers of the bars on the feathers in different sections so proportionate to the size of the feather that the bars have not room to arrange themselves symmetrically unless they are perfectly straight.

According to tradition which is entirely credible, the Campines, in both the black-red and the black-white color

LIGHT BROWN LEGHORN FEATHERS

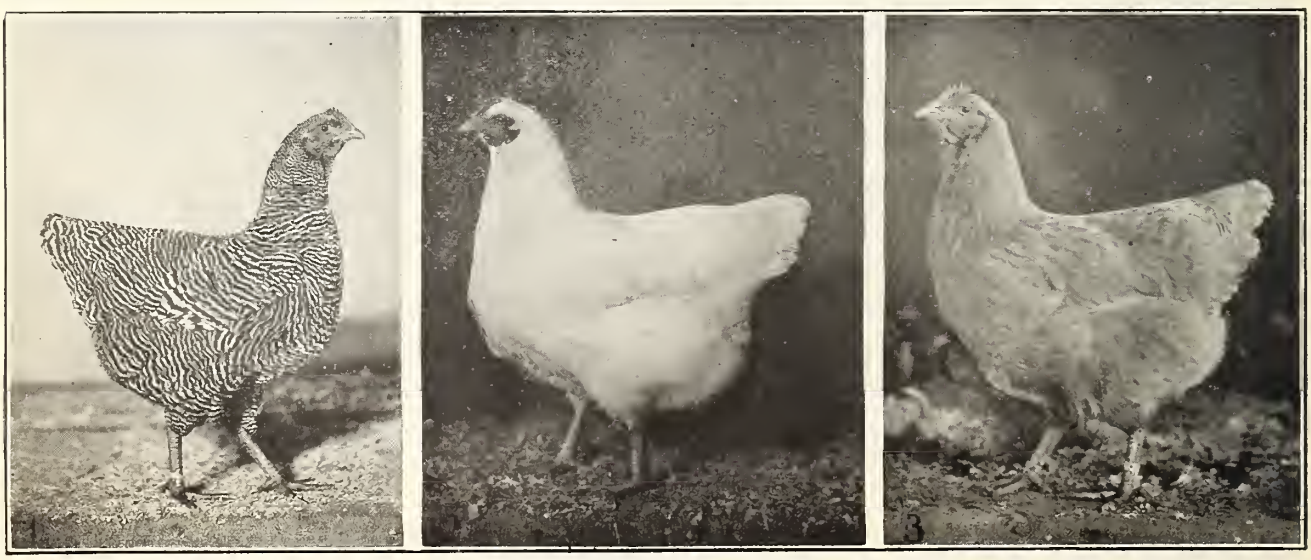
1—male wing secondary; 2—male wing primary; 3—female wing secondary; 4—female wing primary; 5—male neck hackle; 6—female neck hackle; 7—male breast; 8—female breast; 9—male wing shoulder; 10—female wing shoulder; 11—male wing bar; 12—female wing bar; 13—female tail proper; 14—male tail proper; 15—male back; 16—female back; 17—male saddle; 18—female saddle; 19—male covering body (growing from thigh); 20—female covering body.

GROUP TO SHOW COLOR VARIETIES IN PLYMOUTH ROCKS—MALES
1—Barred Plymouth Rock. 2—White Plymouth Rock. 3—Buff Plymouth Rock.

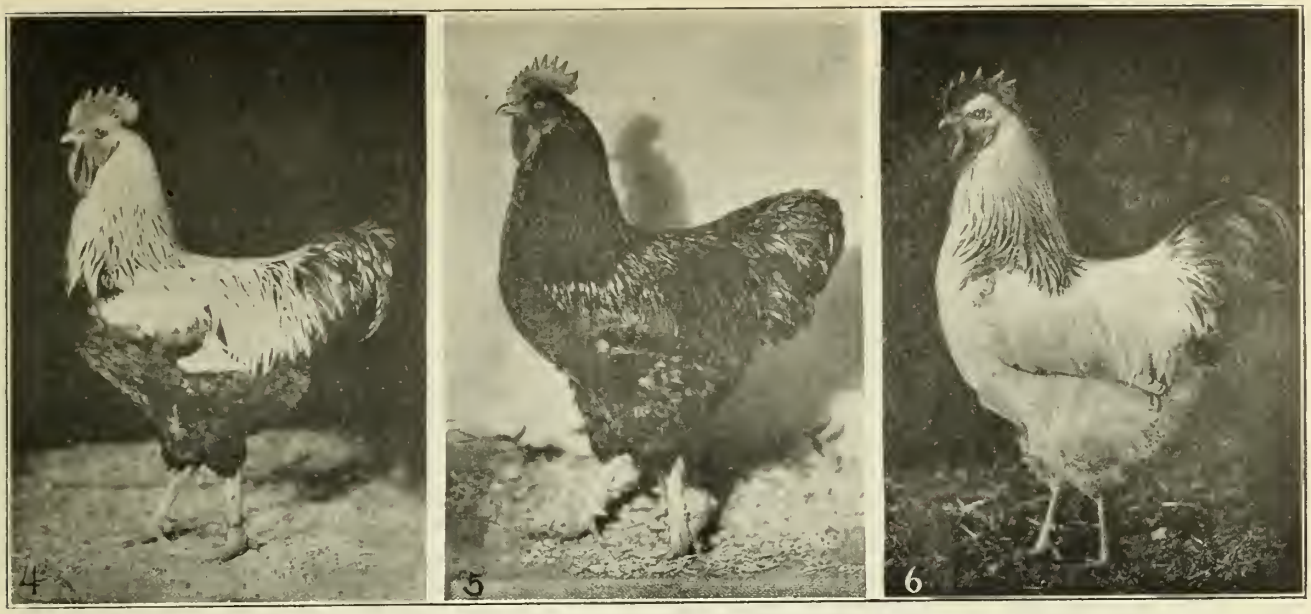
combinations, barred in both sexes, except for the hackles and with traces of barring appearing in the hackles—were bred as the common poultry of a district in Europe for centuries. In parts of France, not very remote from the country of the Campine and the Braekel (a similar breed), fowls called cuckoos—barred all over—were the common fowls from like remote times. It is altogether reasonable to suppose that some of this stock brought to America in early times introduced the Dominique color type—the early barred type which became a pronounced favorite before much attention was given to the improvement of poultry. At the same time the presumption that barred fowls in quantity—as one might say—were derived in Europe in the manner just stated (by evolution from penciled markings), does not exclude the possibility of such fowls coming occasionally in any flock of miscellaneous colors through chance matings. And this sufficiently accounts for the fact that a small proportion of birds barred all over has usually been found in any large stock of various colors and mixed breeding.

That such birds have sometimes come from a cross of black and white fowls is probable. So many poultry keepers have reported cases where barred specimens evidently came from a black and a white parent that the fact seems as well attested as most facts of ordinary observation. But most of the cases of this kind occur where breeding is somewhat miscellaneous, and pedigrees more or less doubtful, and where it cannot positively be affirmed that the bars are plainly a result of the mixture of white and black. In fact, in some instances where barring has been attributed to direct results of this cross there was reason to suppose that it was due to reversion to a not very remote ancestor. In such a case the pattern is not the result of a cross of solid colors, but of a combination of several ancestral factors.

The sum of the matter is that crudely barred fowls appear occasionally in all flocks that are various in color; that without selection of these birds for breeding the appearance of the pattern would be rare and no improvement would be made in it; that with such selection by a



GROUP TO SHOW COLOR VARIETIES IN PLYMOUTH ROCKS—FEMALES
1—Barred Plymouth Rock. 2—White Plymouth Rock. 3—Buff Plymouth Rock.



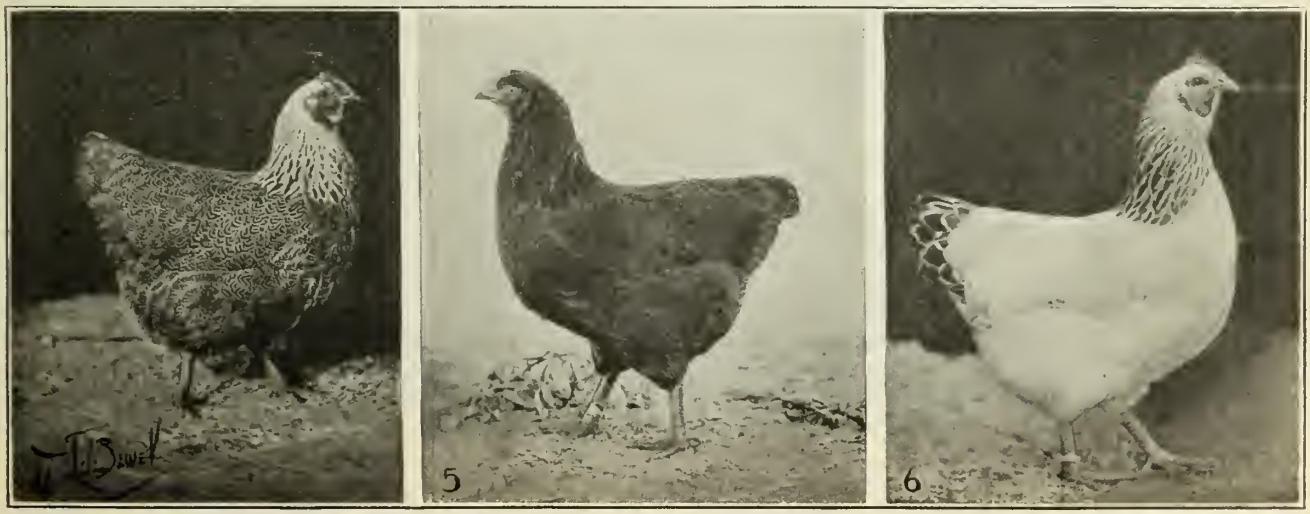
GROUP TO SHOW COLOR VARIETIES IN PLYMOUTH ROCKS—MALES
4—Silver Penciled Plymouth Rock. 5—Partridge Plymouth Rock. 6—Columbian Plymouth Rock.

community—as in the case of selection for red color by the farmers who made the Rhode Island Red—the type would easily be established in a few years as a local color breed; that this, so far as is known, never took place with reference to the barred patterns except in the regions in Europe in which the Campine and the Cuckoo of Flanders are common fowls.

The Ermine Type—White with Black Points

This is the color pattern of the Light Brahma, the Columbian Plymouth Rock, the Columbian Wyandotte, and of the nonstandard Light Sussex. In the perfected form the pattern appears as one in which surface color has been eliminated from all sections except the wings and tail, hackle and saddle (of the males). But the pattern is really a modification of the silver-penciled pattern of the Dark Brahma and the varieties similar in color, and was undoubtedly produced by crossing white specimens on gray with this character of markings. A cross of white on the black-red counterpart of this black-white type gives a buff bird with black points. Such birds were numerous among the early Asiatics and are always found in abundance in miscellaneously bred flocks. Buff Brahmas have been produced over and over again, and sometimes a breeder has made a well-finished strain of this type, but in a buff the colors are not contrasty enough to suit the taste of most people, and the variety has never taken with the public.

Light and Dark Brahmas were bred from the same matings for some years after they were introduced, but they were not birds of the highly finished colors of the modern standard Brahmas. The light birds were, some of them, of fair color; but long after the color was too well developed to admit of producing extremes from the same mating, the dark culls of the Light Brahmas had a great deal of more or less distinct traces of penciling in sections where a clean white surface is desired. In fact, to the present time the production of good black wings and tails with intense black striping in the hackles is in most cases accompanied by "ticking" in the web of the feathers of the backs of females, and by a tendency to



GROUP TO SHOW COLOR VARIETIES IN PLYMOUTH ROCKS—FEMALES
4—Silver Penciled Plymouth Rock. 5—Partridge Plymouth Rock. 6—Columbian Plymouth Rock.

light pencilings of black on the thighs of the males, and to black in the breast at the shoulders. The males will carry more black pigment than the females without producing black in the surface of white sections, because the Standard allows light V-shaped striping in the saddle, and this takes up the excess of black which in the female tends to scatter through the plumage of the section without taking any symmetrical form. Among mongrel fowls that have in them the blood of many improved color varieties, specimens are frequently seen that are white, or nearly white, on the breast and underside of the body, while quite strongly penciled on the back—especially on the cushion near the tail—and more lightly on the sides.

Columbian Plymouth Rocks, as made by the originator of this color in Wyandotte type, were produced by crossing a Barred Plymouth Rock cock and a White Wyandotte hen. The pattern was also produced by crossing the Rhode Island Red (which has really the same pattern with the black—on a red ground—reduced to the minimum) with a White Wyandotte. It was also made by crossing the Light Brahma and White Wyandotte, and while I am not authoritatively informed that such is the case, I have no doubt that in improving the color, and perhaps in making some strains, Silver Penciled Wyandottes were used. The first Columbian Plymouth Rocks were mostly the single combed specimens from Columbian Wyandottes. It is apparent from what has been said of the methods of making the Wyandottes that the Rock variety could have been made by the same combination of colors with single combed birds. The Light Sussex is a more or less frequent color type from the mixed flocks of Sussex fowls, recently developed as an improved variety.

Some modifications of this ermine type of coloration have been made. In the Black-Tailed Japanese Bantam the black is retained in the tail and wings, but eliminated from the neck. In the Lakenvelder the hackle in the male and female is all black, and the saddle feathers of the male are also black.

Mottled and Speckled Color Types

A mottled pattern in fowls is one in which two or more colors are irregularly mixed, all the colors being found in all sections, but without a regular pattern either in the section or on individual feathers. Some feathers may be all of one color, some of another, and where a feather has more than one color the distribution is usually very erratic. A speckled color pattern is one in which rather small marks at the tips of the feathers are regular, occurring on all feathers, or on so many that the distribution of the spots on the surface plumage is very uniform.

The Ancona is the most familiar example of the mottled pattern. The Houdan has practically the same color. In these varieties the effect is produced by a portion of

SILVER PENCILED FEATHERS

1—female wing secondary; 2—female wing primary; 3, 4—female neck hackle; 5—female wing front; 6—female breast; 7—female wing bow; 8—female back; 9—female saddle; 10—female upper tail proper; 11—female lower tail proper; 12—male breast; 13—male wing bow; 14—male body covering (growing from thigh); 15—male neck hackle; 16—male back; 17—male saddle; 18—sickle.

the feathers being tipped with white. As the Standard is now, a small tip on about one feather in five gives the desired amount of white in most sections, but on the back only one tipped feather in ten is required to give the same effect. The old-style Anconas and Houdans had very much more white, so much that as the plumage faded with age some birds became nearly white. The Mottled Java, now rare, has this character of plumage. At one time a breed called the Erminette was developed with the colors of the modern Ancona and Houdan reversed (white with small black tips and flecks), which were not as regularly distributed as in good specimens of Ancona and Houdan, yet presented some regularity.

In all the old miscellaneously colored stocks mottled and speckled hens having the three colors—white, black, and red (or brown)—quite equally mixed in all sections, were occasionally found. In some places these were called "calico" hens, just as horses of broken color are so described. In the modern Speckled Sussex and the Mille Fleur Bantam this type of coloration is reduced to a uniformity that is very pleasing. The pattern is a brown, red or buff plumage, having each feather tipped with white and black—the white in the form of a small spangle, and the black as a bar between it and the color of the body of the feather. In ordinary stock the white tip is irregular. In the finest specimens it is quite distinctly V-shaped.

Solid Colored, or Self-Colored Fowls

The elimination of all color gives white plumage. In the preceding discussion of color the term elimination has been used in a manner which may possibly have suggested to the reader that changes in color were made instantaneously—by the simple failure of color to appear. This is true as to some cases of albinism, but in the case of some so-called albinos or white "sports," what is known or recognized as probable in regard to the origin indicates that the elimination of a color is much more likely to result from breeding which progressively reduces it than from sudden failure of pigmentation in a line carrying normal quantities of color. This situation, however, pertains to conditions after the original colors were much reduced in intensity.

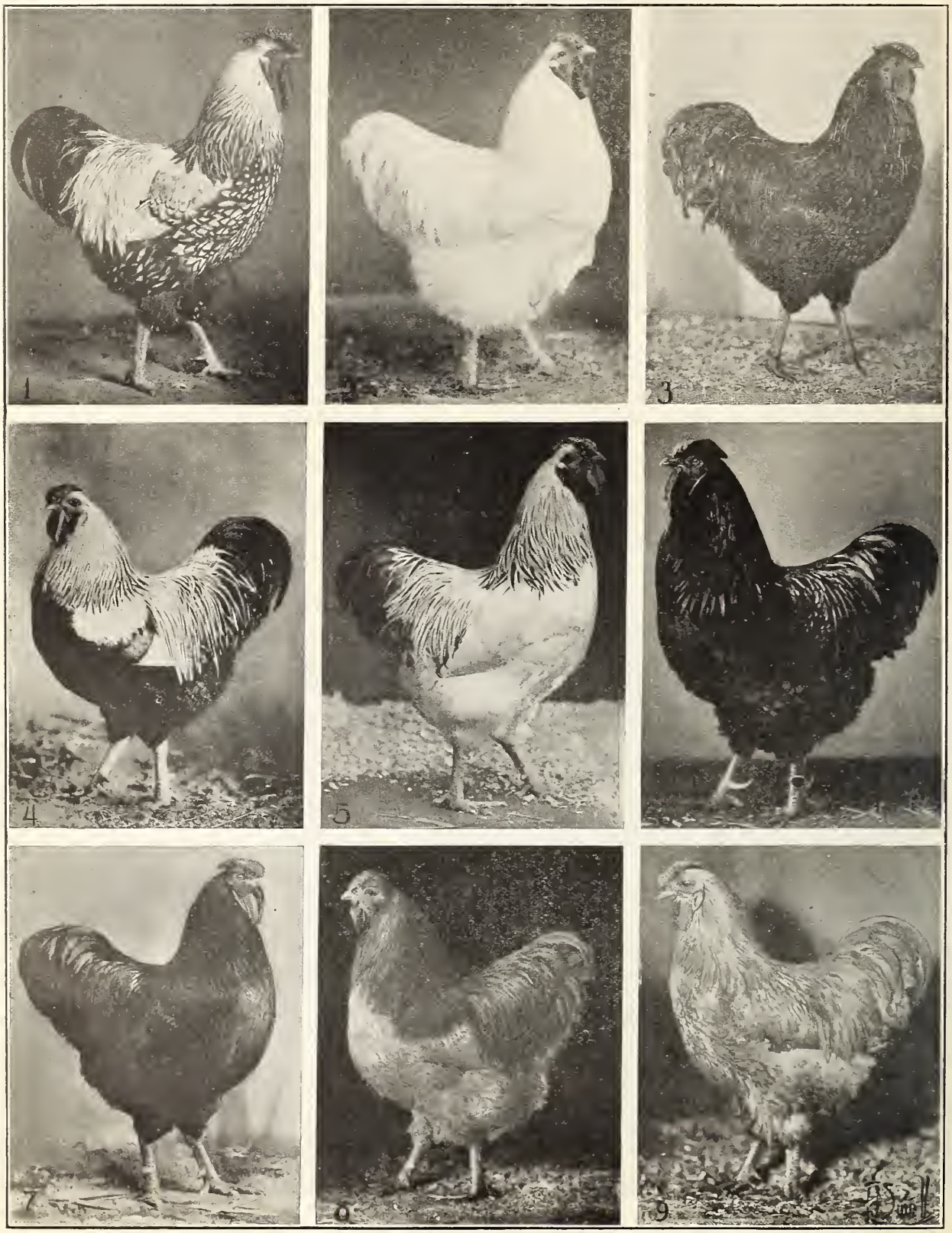
The first white fowls were unquestionably albinos. The white fowl appearing in the wild species had little chance to survive. Lacking the protective coloration of its species it became an easier prey to its natural enemies. Indeed, as an abnormal member of its race it would certainly in many cases be almost instantly destroyed by others of its race—even by its own mother—for after centuries in domestication hens still are prone to destroy at first sight a chicken in their brood that is conspicuously unlike the others. In domestication the white "sport" had a better chance to survive. It had at least an even chance of being owned by its mother, and with a little care the owner could keep it safe from harm. Once a white bird grew to maturity the possibility of its exerting a great influence upon the color of its race in chance matings was considerable, while, if the owner took an interest in experimenting with it, remarkable changes could be made in a comparatively short series of years. The method and the possibilities of this will be shown in the discussion of the phenomena of inheritance. It should be said here that even in the whitest fowls faint traces of either red or black, or of both, remain; there is never absolute elimination of pigment. The ordinary white fowl that is not bred to reduce the traces of color as completely

SILVER LACED FEATHERS

1—male neck hackle (light as used for breeding open laced females); 2—male neck hackle (dark for breeding exhibition males well striped on neck and saddle); 3—male breast; 4, 5, 6—male wing bar; 7—female wing front; 8—female wing bow; 9—female wing bar; 10—female back; 11—female cushion; 12—female tail covert; 13—male open-laced saddle (near tail); 14—male dark striped saddle (for breeding exhibition males).

as possible, is not really white at all, but light cream color or gray.

Black fowls might occur in nature much more frequently than white ones. Chance matings of the darkest birds of the black-red type would lead toward black color, and if by any means (as by the isolation of a dark family, or possibly a series of chance matings of dark birds) the dark line was continued it would inevitably become black unless something operated to check it. Yet so far as we know or may reasonably assume, black fowls

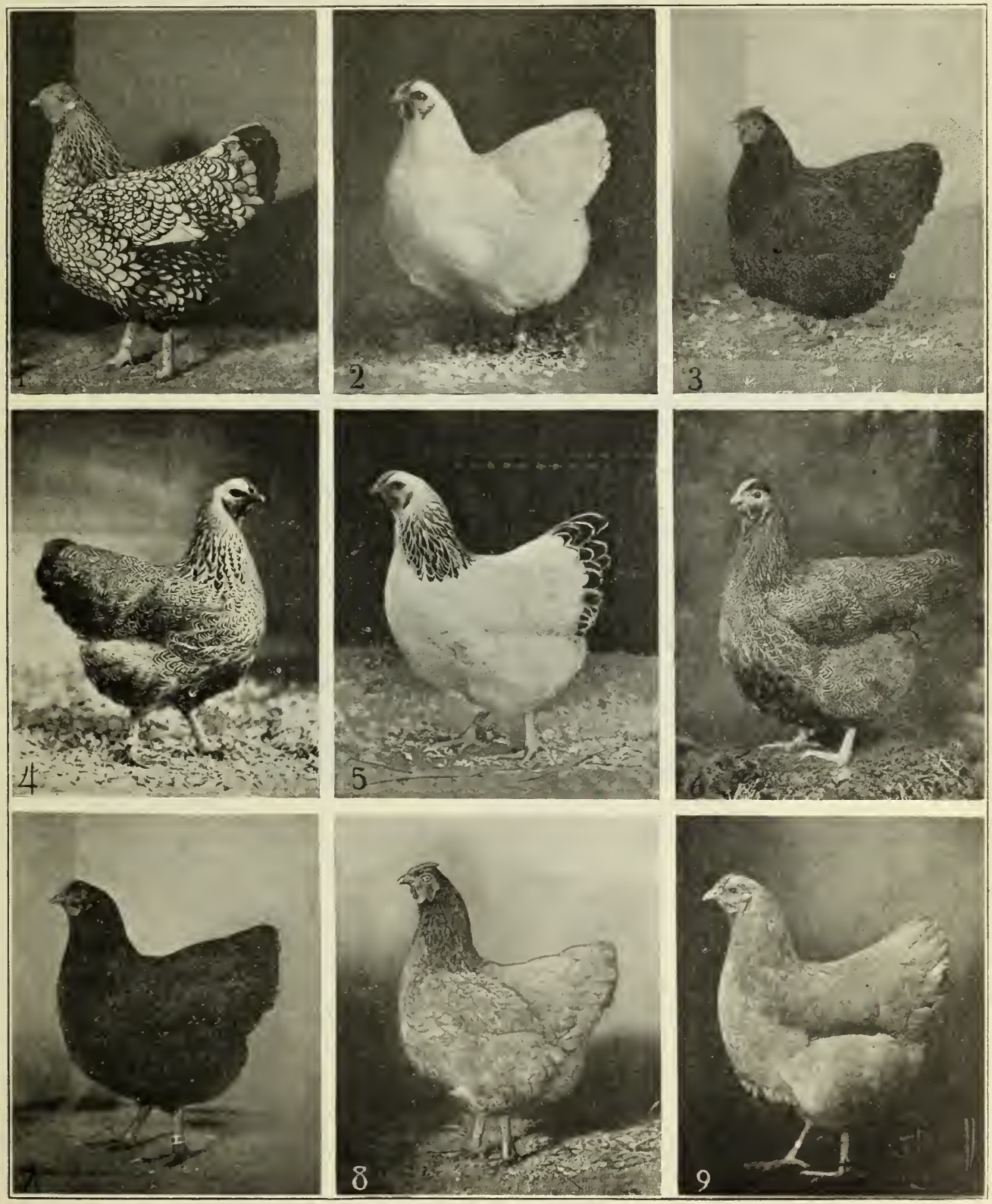


GROUP SHOWING COLOR VARIETIES IN WYANDOTTES—MALES

1—Silver Laced Wyandotte. 2—White Wyandotte. 3—Golden Laced Wyandotte. 4—Silver Penciled Wyandotte. 5—Columbian Wyandotte. 6—Partridge or Golden Penciled Wyandotte. 7—Black Wyandotte. 8—Blue Wyandotte. 9—Buff Wyandotte.

did not occur in nature. That might be because, though less conspicuous than white ones, they were still so much more conspicuous than the brown fowls that they were easier found by creatures that prey upon them. Besides, there are two other things which may account for the failure of dark specimens to continue.

The first of these is the possibility that black males were not as attractive to the females as those of more conspicuous color. In the Darwinian theory of natural selection the brilliant colors of male plumage are regarded as having been developed to attract the females, or as a result of the attraction of bright colors for the females.



GROUP SHOWING COLOR VARIETIES IN WYANDOTTES—FEMALES

1—Silver Laced Wyandotte. 2—White Wyandotte. 3—Golden Laced Wyandotte. 4—Silver Penciled Wyandotte. 5—Columbian Wyandotte. 6—Partridge or Golden Penciled Wyandotte. 7—Black Wyandotte. 8—Blue Wyandotte. 9—Buff Wyandotte.

If this view is correct, the chances of a very dark male attracting females from other males would be diminished. But considering the characters of black fowls as we know them, the most serious obstacle to the perpetuation of black fowls under natural conditions is their color when hatched. The chicks of all established black varieties are not—as would naturally be supposed—all black in the down; but the underpart of the body, the breast and front of the neck are a straw color, or light canary color, frequently extending well up on the sides and at the rear, so that except when seen from above the chick is almost as conspicuous as a white chicken. This coloration of chickens that will be black when they feather is one of the most curious phenomena in poultry culture, and one not easily explained on any accepted theory of evolution of types. It is common to chickens of pure black races, and was commonly observed in the black chickens of the old mongrel stocks, but black fowls that come from crosses of birds that are only in part black often have nearly black down all over them.

SILVER SPANGLED FEATHERS

In the spangled pattern every feather has a dark spangle at the tip. The soft feathers generally have slate ranging from very light to nearly black in the undercolor.

As in the case of white fowls, the color of black birds is not an absolute unchangeable black. The ordinary black fowl is either a dingy brown black, or a grayish black. Even well-bred fowls with good black surface color usually show traces of red or gray somewhere in the plumage, and an excess of black pigment will result in purple barring that detracts from the looks of the bird quite as much as the other faults mentioned. Blue fowls without distinctive markings are produced directly from crosses of black and white fowls. In some cases only blues are produced; in others the progeny is varied in color—some blue, some mottled, some barred, and sometimes both black and white specimens with those of mixed color. Our information as to the pedigrees which give different results is not in most cases sufficient to serve as a basis for study of cause of the difference in results. Some of the more definite cases will be considered in detail in another connection.

Buff and red result from the elimination of black as a separate color, with the distribution of red to the parts which were formerly black, and from such a blending of black and red in uniform distribution throughout the plumage that they appear as one color. The black remains to a slight extent in most red fowls, and usually appears to some extent as gray in buff fowls. Common yellow, red or brown fowls with more or less black and white in the plumage, but still attractive specimens in mixed flocks, give the foundation for buff and red. As has been shown, the male Golden Penciled Hamburg approaches a red color, but except in the Buff Cochin, plain buff and red did not begin to interest breeders generally until about 1890.

As in the early Brahmas, the Light and Dark varieties were evolved from an intermediate crude color pattern, so in the Cochin the light black-red became buff—but without the black points as retained in the Light Brahma. The separation of the Cochins was not made at once and sharply in two varieties, but in the buff and red (nearly self-colored) varieties there were five classes: (1) golden buff sometimes called orange buff, (2) lemon, (3) silver buff—an ashy buff, (4) cinnamon, or cinnamon buff—a reddish-brown buff, sometimes quite red, (5) silver cinnamon—like the cinnamon, but with white, giving it an ashy tinge in some places and in others producing a somewhat mottled effect. The "silver" buff and cinnamon Cochins disappeared early in the history of the breed, but, three shades, known as lemon orange and cinnamon, were more or less in evidence—with all shades between—until near the end of the last century, when a shade intermediate between the popular lemon and orange buffs was accepted as the most desirable single standard of color and described as golden buff.

The popular buff varieties other than the Cochin were all introduced and developed between 1890 and 1900. After nearly half a century of indifference of this color there was then for a period such intense interest in it that it was often referred to as the buff fever. The Buff Leghorn, Buff Wyandotte and Buff Plymouth Rock were all brought out at this time. The first birds exhibited as Buff Plymouth Rocks and Buff Wyandottes were Rhode Island Reds—simply specimens of fair buff color, with other characters that would allow them to pass as of the breeds whose names were given them. Other Buff Wyandottes and Buff Plymouth Rocks were made by crosses.

The crude types could be secured from many different combinations. Some of the best early buffs in these varieties came, as would be expected, from crosses in which Buff Cochins were used.

The Buff Leghorns came here from England. The foundation stock appears to have come in the first place from Denmark, where yellow "Italian" fowls were common, it being the custom through many years for the countries of Central Northern Europe to buy large quantities of young fowls annually from Italy. After interest was focused on the new variety, the combination of Brown and White Leghorn would appear (from an analysis of the flocks as produced in those days) to have been freely used. It has been said that some of the early strains of Buff Leghorn had a Buff Cochin cross, but none of the variety ever seen in America showed any trace of such a cross. Everything they showed could be accounted for without going outside of the Leghorn family. It is quite remarkable that with the popularity of Brown and White Leghorns in America, and the interest taken in new breeds and varieties, yellow or buff Leghorns were not produced here more extensively or earlier than elsewhere. The probable explanation of this is simply that attention was focused on other things. That some birds of this description were produced is a matter of record. Fowls called Buff Leghorns were shown at Hartford Conn., in 1867. Early references to poultry in agricultural literature also mention a "Red Leghorn," but whether this referred to such Leghorns as would now be called red, or is only another name for the Brown Leghorn is uncertain.

BLACK FEATHERS MOTTLED WITH WHITE

The ideal plumage in this pattern has V-shaped white tips on a proportion of the feathers. The present Standard calls for a white tip on about one feather in five, but many winning birds have more—some nearly every feather tipped.

Laced Buff and Red Varieties

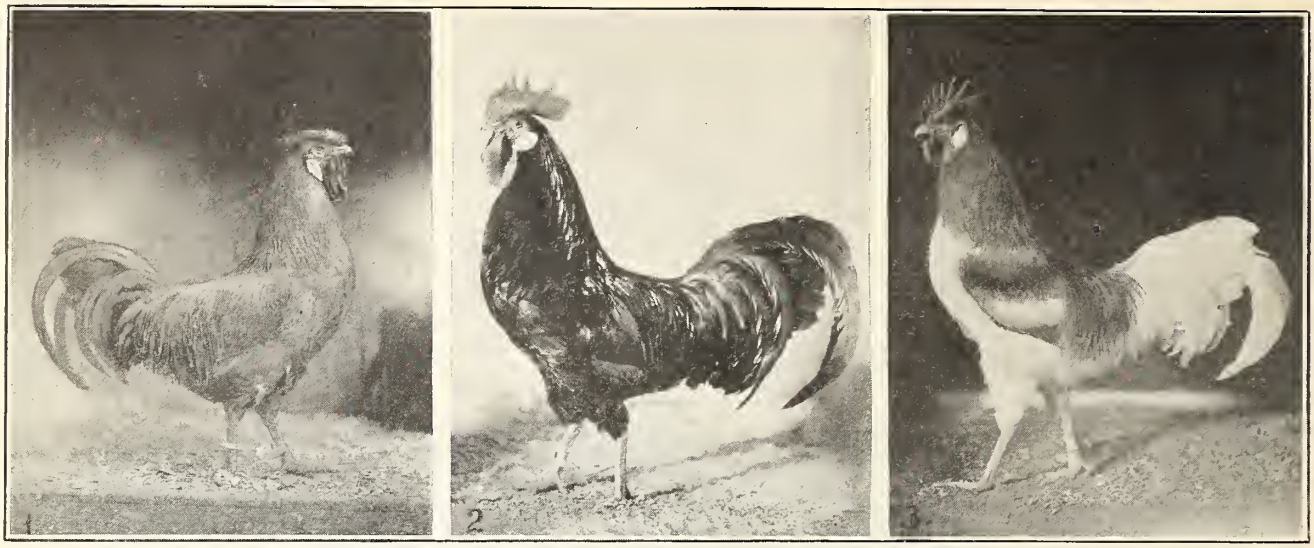
While the Buff Cochin was through nearly half a century after its introduction the only popular buff variety, Buff Polish, both clear buff and buff laced with a lighter buff, were among the early introductions. None of the former have been seen here for a long time. Of the laced variety a few are seen occasionally. The white or light lacing on a darker buff is said to have been produced by crossing White and Golden Spangled Polish—the white cross eliminating the dark color and giving in its place a light shade of buff. Another variety with the same color pattern in a darker shade of red and with clearer white lacings—the White-Laced Red Cornish—was made in this country.

Some Miscellaneous Color Patterns

In the foregoing discussion of the colors of fowls, the relation of the various common patterns and the mode of producing them, the author has necessarily followed certain general lines which would bring in the most important types in their natural and logical relations. In doing this he has made it a point to refer to other types than those in the direct line of statement whenever that could be done without getting too far from the main line of statement. In this way most of the varieties have received mention in connection with those to which they are most closely allied. There remain still a few varieties having special features which should be described.

The Pyle Pattern of Color.—It has been shown how the elimination of the ed from the black-red pattern operates. If the black be eliminated from this pattern, the red remaining and the black replaced with white, what is called a Red Pyle is the result. In this variety the male is white except the neck hackle, saddle, wing bows and edges of the flight feathers, and the female is white with yellow lacing on the hackle and with salmon breast. This pattern is found in Games and in a nonstandard variety of Leghorn.

The Birchen Pattern.—This is a pattern which was common in old mongrel stock, but has been preserved in improved stock only in Games and Game Bantams. The male is of the regular black-white type. The female is black, except the hackle, which is like that of the male. This type is the converse of the case where the characteristic markings of the female are assumed by the male in every section of the plumage. Here the female has the markings of the male wherever the plumage admits of that. Not having the type of feathering on the back and saddle that the male has, she is black in those sections. The black-red counterpart of this pattern is found in black hens with red hackles. This pattern is not seen in any standard variety, nor would it attract as much at-



GROUP SHOWING COLOR VARIETIES IN LEGHORNS—MALES
1—Rose Comb Buff Leghorn. 2—Single Comb Brown Leghorn. 3—Red Pyle Leghorn.

tention as the gray-necked black hen, but hens of the type were often seen in the old mongrel flocks.

The White-Crested Black Polish.—In this variety both sexes are entirely black, except for the large crest which is white. By what means this extraordinary and striking effect was produced is not known. The type is a very old one. Tradition says that at one time there existed a race of black-crested white Polish, but no specific and authoritative information to that effect can be obtained. Many efforts of fanciers to produce that type have failed. It is said that a few years ago a Dutch fancier had made gratifying progress toward it in a Polish Bantam. In 1920 an American breeder made a cross from which he obtained one black crested white pullet, but the bird was accidentally killed.

Some Curious and Important Features of the Development of Color Patterns in Fowls

The phrase "like begets like" may be regarded as the common law of reproduction. In a general way everyone knows the law that every living thing produces offspring —as the Biblical phrase reads—"after its kind." In the popular view based upon casual and superficial observation, the species and varieties of wild animals and birds are supposed to reproduce color and type with absolute fidelity. "Nature" is supposed to have established types of form and color which are reproduced in perfection by any union of a male and female of the species. Novices in poultry breeding usually conceive of a breed, and of each variety in a breed as having the same character as is popularly attributed to species in nature. They soon discover that the domestic breeds and varieties—as bred to definite standards—do not have this characteristic; but still imagining that wild species do have it, they denounce the standardized types as "unnatural" and demand that standards be made that will conform to the natural laws of reproduction and will enable the amateur to breed to accepted standard types by mating standard specimens.

The fundamental fallacy in this argument is the assumption that in nature the color and patterns are reproduced with accuracy. People suppose that they are, because—as a rule—all wild birds and animals of the same species look just alike to them. The amateur critic of artificial standards recognizes this, but overlooks the fact

GROUP SHOWING COLOR VARIETIES IN LEGHORNS—FEMALES
1—Rose Comb Buff Leghorn. 2—Single Comb Brown Leghorn. 3—Red Pyle Leghorn.

GROUP SHOWING COLOR VARIETIES IN LEGHORNS—MALES
4—Rose Comb White Leghorn. 5—Black Leghorn. 6—Silver Leghorn.

that when he first began to be interested in poultry types all birds of the same variety—good, bad and indifferent in shape and color—looked just alike to him. The truth is that there is considerable variation in color and the distribution of color in wild birds, though in those that survive, extreme variations are unusual. This is not because greater variations do not occur, but because in nature so many things combine to destroy the odd individual before it can reach maturity and through reproduction give something of its unusual character to a considerable number of its race.

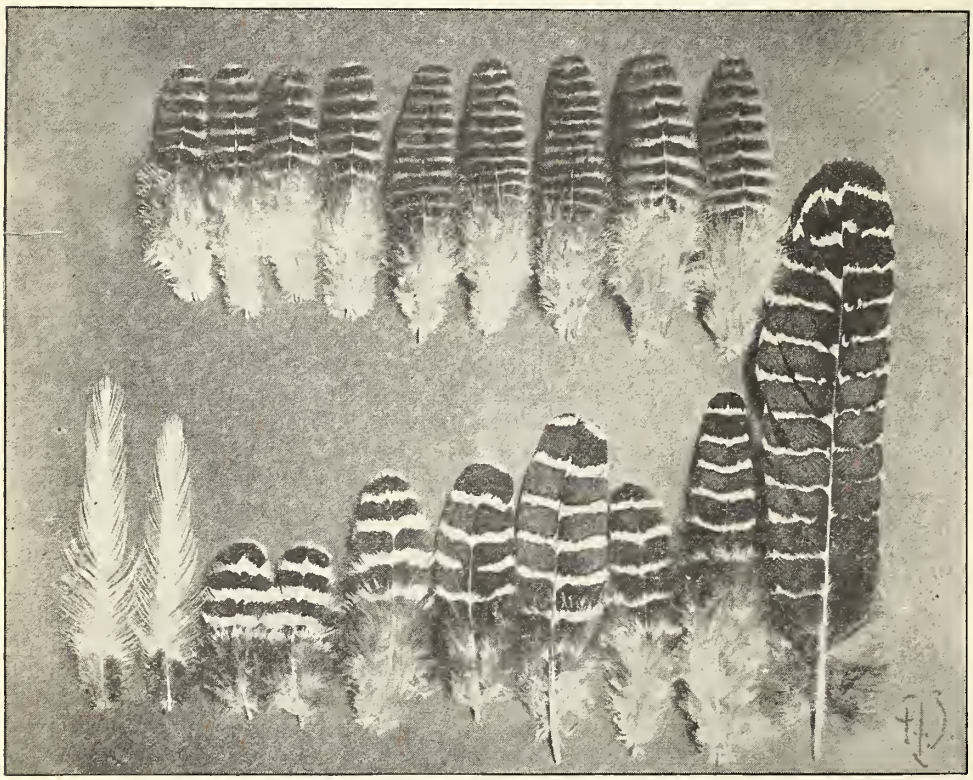
A poultry breeder who supposes that wild birds breed true to color types should take the first opportunity to examine carefully the colors of the captive Mallard Ducks in any of the many places where these are kept in numbers large enough to make comparison for this purpose useful. The Mallard has striking colors, and they are the same as those of the domestic Rouen Duck, and also are colors often found on the common duck. If the flock of Mallards examined is a large one, it will be found that the range of shades of color is almost as great as in flocks of exhibition Rouen Ducks that are produced by the double-mating system, which is regarded as such a stumbling block in the way of the novice in poultry breeding. The darkest birds in a flock of Mallards are not often as dark as the very dark Rouens, but the lightest colored Mallards are lighter than is at all usual in Rouens, and striking differences in the markings will be noticed as soon as they are compared, even at the greatest distance at which their character can be seen. If one is at all versed in judging the quality of color in Rouen Ducks he will note at once that few Mallards are as uniformly marked as the ordinary standard Rouen.

"Nature's standard" for color of a species of wild birds is really the standard which applies in the making of a domestic breed as a local breed with only one color variety. In the early stages of the differentiation of domestic breeds of local origin and various colors into distinct color varieties, the rule of mating male and female that are nearest the standard for color adopted gives results that are generally accepted as satisfactory because breeders are not yet very critical, and the newness of the breed or variety is an excuse for many faults in color

GROUP SHOWING COLOR VARIETIES IN LEGHORNS—FEMALES
4—Rose Comb White Leghorn. 5—Black Leghorn. 6—Silver Leghorn.

that later come to be regarded as intolerable in a stock of reputable quality. Also, in "Nature" there is no such thing as standards of type fixed, as artificial standards are, down to the most minute detail. There are combinations of color and brilliancies of color in many wild birds that are not found in our domestic fowls, but by what we call "artificial" methods poultry breeders are able to make developments of the natural colors and markings of fowls far surpassing the natural types. In fact, the finished color combinations of the poultry fancier bear about the same relation to natural colors as natural stone surfaces do to beautifully polished surfaces, or that rough lines of form do to perfect lines.

In domestication without selection for color a race of fowls not only becomes of various colors, but it is not possible to say to what extent the progeny of any individual or pair will have the color of immediate ancestors. To establish anything approaching even such a tendency to uniformity of color as appears in wild species men must select for color, and if they begin to select for a color with complex markings they quickly discover that undeveloped natural color types possess possibilities far beyond anything produced in nature, and also that there are some very curious things in the behavior of colors in plumage. By observation and experiment they find that matings of apparently like birds do not always, or even usually, give progeny like the parents, but that the mating of like specimens tends always to increase in the progeny the thing that was like in both parents; and so, to maintain any fixed standard, it becomes necessary to find what degree of departure from the type will, when mated with the type, accurately reproduce it, or what degrees of departure from it in different directions will result in the desired type.



PENCILED HAMBURG AND CAMPINE FEATHERS

Above—barring as seen on the Penciled Hamburgs and in accordance with ancient usage called penciling in Hamburgs. Below—barring as seen on Campines. The neck hackles of Campines are white in the silver variety and buff or bay in the golden, with slate at the base.

One of the best illustrations that can be given of this is the case of the behavior of buff color. The shade of buff which to most people appears most beautiful is the lightest color that can be described as a golden buff. It is a buff with a general tendency to become ashy or whitish. Mating specimens with this shade of color and this tendency develops the weakness of the color, making an unsound buff. Hence, to maintain the color, standard specimens must be mated with birds that are a little darker than the preferred shade of color; and, to use advantageously specimens that being of standard type in everything but a slight variation from the preferred shade of color are desirable and valuable breeders, such birds must be mated with those that are slightly off color in the opposite direction. If the standard shade of color is taken at a shade enough darker to admit of considerable reduction of strength of the buff color without breaking into mealiness or ashiness, that fault is avoided, but uniformity of shade in stock of different breeders is not secured, for the guide that keeps uniformity in flocks when the lightest buff is standard, is the line between good clear, bright buff and the color that just falls short of this description.

Continuous breeding of the lightest colored buff birds would eventually produce white birds. Continued breeding of the darkest buff birds produces, after a while, red birds and if the darkest of these are selected year after year the black-red combination would soon appear. If all the fowls in the world but a few buff ones were exterminated, all the colors we now have could eventually be reproduced from those buff chickens by artificial selection. But if these few buff birds were released to live a wild life the chances of establishing themselves would be infinitesimal; they would be exterminated by their natural enemies long before variation could develop a protective coloring.

In the original black or brown-red color the birds are protected in the wild state, but all the possibilities that lie in their colors and their miscellaneous assortment of color patterns remain undeveloped. Domestication furnishes the opportunity for the elaboration of every possibility contained in the original color pattern. The object of making all the different colors and color patterns in fowls is not to find the types that are easiest to reproduce, but to find the utmost development of natural tendencies and patterns. The ordinary, poorly marked black-red fowl is the typical example of what natural selection can accomplish in color of fowls. The varieties described in this chapter show—in part—what intelligent control of reproduction of color can accomplish. We

have by no means reached the end of the developments in this direction.

Relations of Standards to Color Reproduction

The principles of breeding as applied to get these results are the higher laws of inheritance. The true breeder does not mate birds of a certain rough type and let results come as they will, but forms his ideal standard, making it the full expression of something contained or suggested in a natural or an unimproved domestic type, and then seeks to find by what process of mating the result he seeks can be secured. He does not try to make standards by which as large a proportion as possible of ordinary and indifferently bred poultry will grade as first-class, but fixes upon what he conceives to be the perfection of color patterns or combinations which may be evolved from the natural types, and then studies to learn how to control the natural laws and tendencies to get the results sought. The development of the practices necessary to get these results is not only inevitable, but is a natural and logical application of special laws to special purposes. The beginning of an understanding of these laws is observation of what superficially appear as irregularities in reproduction. In considering these irregularities we will begin with the color that brings the most important of them out conspicuously.

In the black-red and black-white color combinations, in which the males have certain sections predominantly black and other sections predominantly red or white—as the case may be—an accurate comparison of the general shade of color of males and females is impossible. But when the pattern is the same in all sections in both sexes, as in the Barred Plymouth Rock, differences in the color of male and female are as easily noted as differences in the colors of different sections of the plumage of a bird. In this variety the males run quite regularly lighter in color than females of the same breeding. Consequently, when a breeder matches up a pen of a male and four females for exhibition (to meet the requirement of the Standard that the male and females shall match in shade of color), his selection of a male will—as a rule—be from a mating that produced females of a darker shade than the male in question. We are considering, for the moment, what the breeder will do simply in the matter of selection to match a pen of females, when he selects on appearance without considering the breeding of the birds. Wherever the male that matches his females in color may come from (whether from his own stock, or from that of another breeder), there is not one chance in a hundred that if he matches them exactly he was from a mating, line or family in which the females are as light in color as these.

The result of this in the early days of the breed was that exhibitors looked everywhere for males to match their females in the exhibition pen, or for females to match a choice male; but before long they began to breed exhibition cockerels and pullets from different lines. The male line has the males of standard color, but the females darker. The female line has the females of standard

BARRED PLYMOUTH ROCK FEATHERS

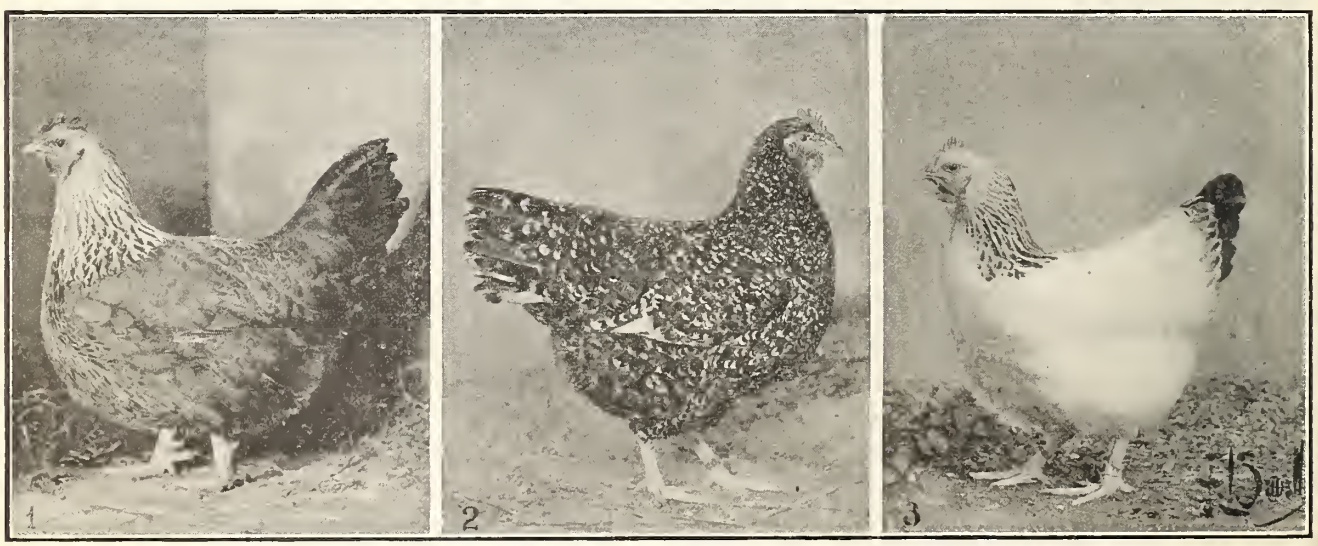
Ideally the bars of this variety should be of equal width and perfectly straight across the feather in all sections. The feathers illustrated show the variations from the ideal still found in the finest specimens. In the hands of skilled breeders the barring constantly improves. Progress is not always marked in short periods, but comparison of birds eight or ten years apart generally shows great improvement. This is good barring in 1921. Ten years from now there may be no feathers better than the best in this lot, but there will probably be birds with even straight barring in all sections.

SOME COLOR VARIETIES IN ENGLISH BREEDS—MALES
(Continued on page 53)
1—Silver Grey Dorking. 2—Speckled Sussex. 3—Light Sussex.

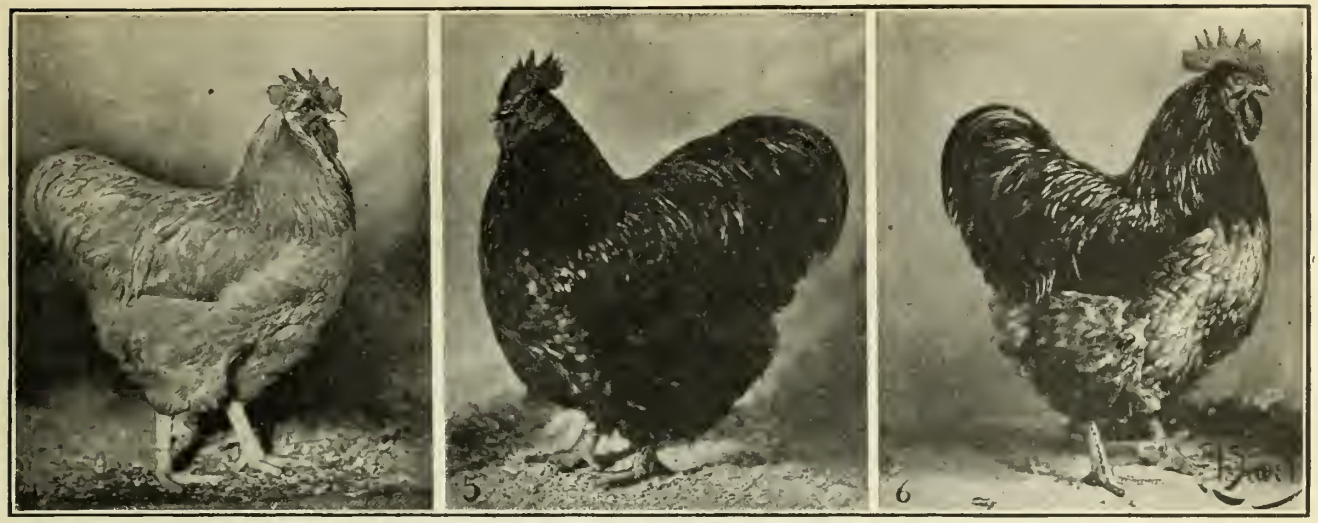
color, but the males lighter. Neither the dark females nor the light males can be used for exhibition in good competition, though sometimes an unusually dark "pullet-bred" male, or an unusually light "cockerel-bred" female may pass in an ordinary class of birds.

If the birds are mated as shown the result is to give males a little lighter than standard, and females a little darker than standard. And it is sometimes possible to select from these, males and females that are near enough to standard color to match well. It is occasional cases of this kind that furnish the evidence cited to prove that standard specimens of both sexes can be produced from a single mating of standard-colored male and female. With continued matings in the same line the general tendency for the sexes to differ so much in color that brothers and sisters do not match in color reasserts itself, and the exhibitor who is trying to produce exhibition males and females from the same mating is not able to produce either sex in quantity of the quality that the breeder of two lines regularly obtains.

It is often asserted that by having the Standard provide that the male should be a definite number of shades (whatever was determined upon as right and proper) lighter in color than the females the trouble would be avoided. This view overlooks the fact that it is a general principle of standards for poultry—based upon popular taste—that the male and female in any variety must either match in color, or have their natural contrasts in color patterns emphasized by making each sex pattern as fine as possible. As it relates to the matching in color when male and female have the same color pattern the requirement is not primarily a "fancier's fad," but is a requirement of popular taste. The visitor to a show who knows nothing about standard requirements can tell at a glance that the fact that male and females in an exhibition pen do not match in color detracts from the appearance of the pen and its value as an exhibit. If the occasion for double-mating systems was limited to this variety it might be expedient, in the general interests of systematic poultry breeding, to adopt a standard for exhibition males and females that would admit of producing standard specimens of both sexes from one mating. But the tendency for the sexes to differ slightly in the form of a character is neither peculiar to Barred Rock color, nor limited to color.



SOME COLOR VARIETIES IN ENGLISH BREEDS—FEMALES
(Continued on page 53)
1—Silver Grey Dorking. 2—Speckled Sussex. 3—Light Sussex.

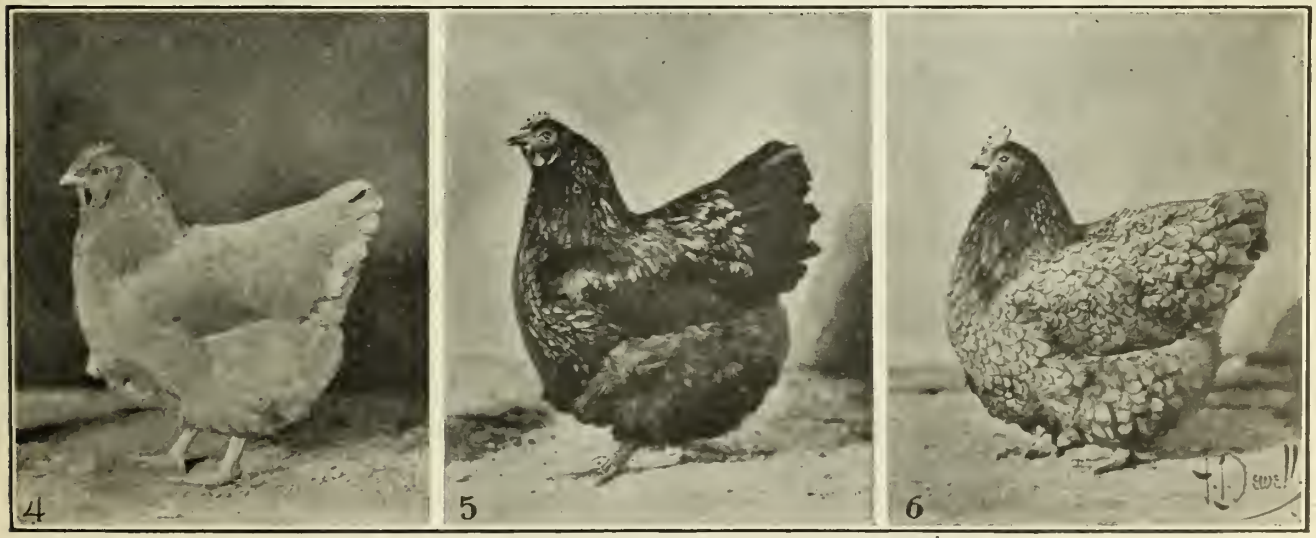


SOME COLOR VARIETIES IN ENGLISH BREEDS—MALES
(Continued from page 52)
4—Buff Orpington. 5—Black Orpington. 6—Blue Orpington.

For a long time the tendency of Barred Rock males to run lighter in color than the females was attributed to the original cross of the Upham Plymouth Rocks, in which a hawk-colored, barred male was used on black females. The idea was that the males constantly tended to the light color of the original male in this line, and the females to the black of the original females. If that were a sound explanation it would apply only to Barred Rocks from the Upham line. There were, however, other lines made from other combinations. And whatever plausibility that theory may have when only Barred Rocks are considered disappears when we turn to the other colors of fowls and find a similar state of affairs.

In all black-red and black-white color combinations (and the all-barred is a modification of the black-white), double matings are used to produce specimens of the highest excellence according to accepted standards. Let us see in the case of the Brown Leghorn how the artificial standard adopted differs from what would be called a natural standard. In the natural type of color the black and red separate into different sections in the male, making the breast and body predominantly black, and the hackle, back and saddle predominantly red. In the female, on the contrary, both black and red are in comparatively equal proportions in every section, with a tendency for the colors to arrange themselves upon the individual feathers in distinct patterns.

No argument is necessary to convince any person of average artistic perceptions that a male of this type, with a pure black in the black sections and a uniform red ground in the red sections, and with nice black striping on the long, fine feathers of the hackle and saddle, is a more beautiful and attractive bird than one with dingy black breast, uneven color in red sections, and no striping on hackle and saddle. Nor is any argument necessary to convince such a person that a female finely stippled in two soft shades of brown, with a nice salmon breast, is more beautiful and attractive than one so dark that the stippling becomes smudged and the salmon tinge of the breast disappears. When breeders began to select for these most attractive types of Brown Leghorn, male and female, there was not as close attention given to breeding as in later years, and while the mating of standard specimens, male and female, was regarded as the model mating

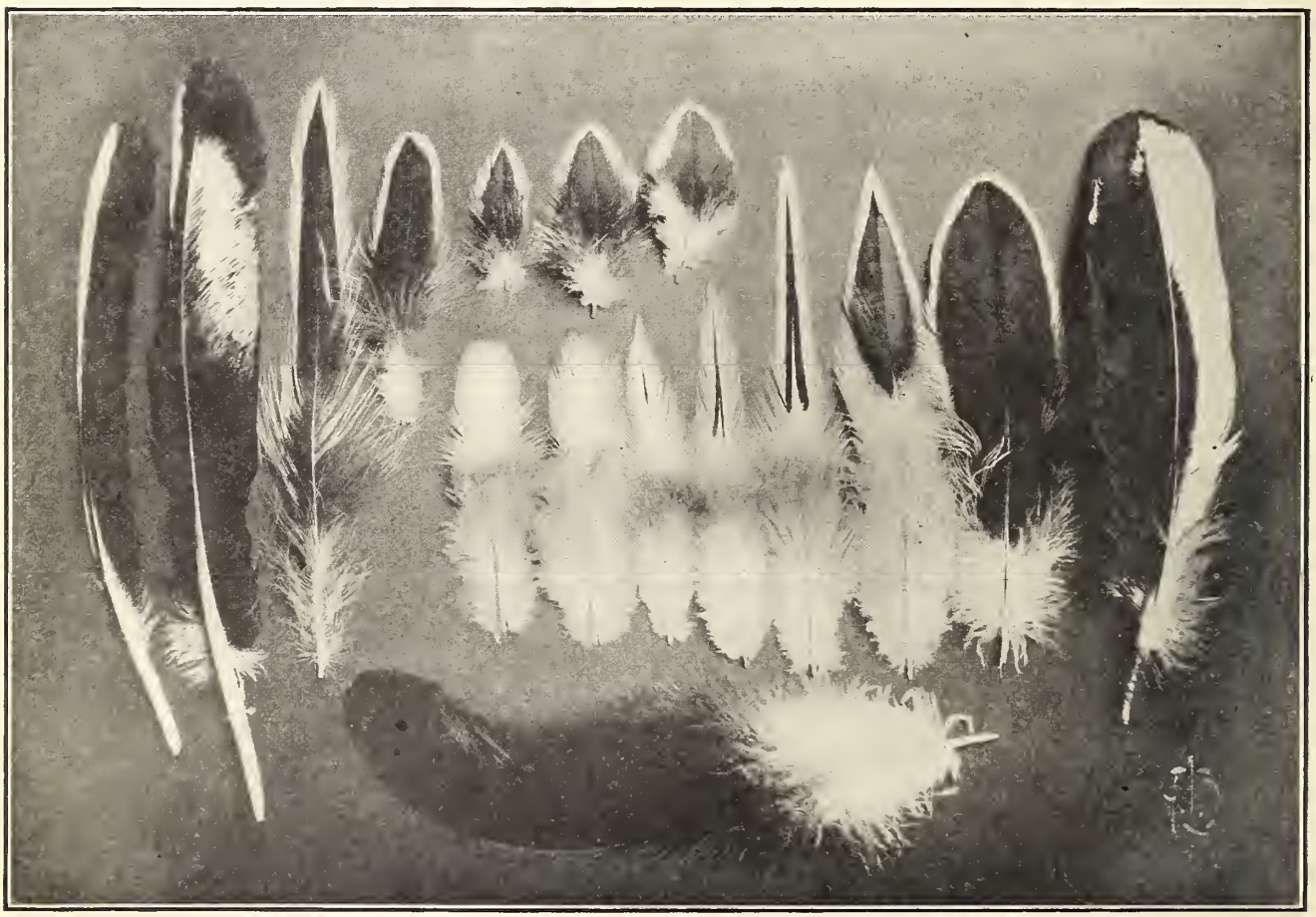


SOME COLOR VARIETIES IN ENGLISH BREEDS—FEMALES
(Continued from page 52)
4—Buff Orpington. 5—Black Orpington. 6—Blue Orpington.

—the one that would most reliably reproduce standard quality—it was the common practice to make a variety of other matings on the principle of making excess of development in a character in one sex offset underdevelopment in the same character in the other sex. It was also a common practice, instead of carefully selecting the females in a mating for similarity of type, to use different types of females either for the express purpose of getting some particular feature from a hen that the other hens in the pen would not give in the same degree, or with the expectation that in the several different types of females at least one would "nick" well with the male. Fanciers who were limited for room and could not conveniently make several separate matings were very apt to do this. The greater number of them did not have individual pedigrees of chicks, nor any way of determining the dams of particular birds from these mixed matings.

Those who did take pains to identify the progeny of particular hens soon discovered that the best colored males came from the darkest hens, and that these best males rarely produced daughters of good exhibition quality. They found that the way to get a standard male from a standard male was to mate him with a female of the color of his dam and his sisters; and the way to get a standard female from a standard female was to mate her with a male of the color of her sire and her brothers; and they found that the finest colored and marked females came from males that were poor in black sections, the black showing a considerable mixture with red, and too light colored in the red sections to show to advantage in comparison with standard-colored males. This did not apply to Brown Leghorns only. It was the same with Partridge Cochins, and with every other parti-colored breed; and the successful breeders and exhibitors were those who recognized the facts and systematically mated to produce the finest types. We cannot see in the direct comparison of males and females of colored varieties which have the same colors in different combinations in the two sexes, that the males run lighter than the females —as in the Barred Plymouth Rocks; but by comparing the females that are produced with males of different shades of color, or vice versa, we can see plainly that this is normally the case. As to why it should be so—that is something we do not know; but as far as practical breeding goes, what we know—the facts, and the means of breeding to get the finest product in each sex—is enough.

Another peculiarity of color is the tendency for females to run darker on the back than on the breast and underparts—this being just the reverse of the original distribution of color in the males. It is especially noticeable in the triple-penciled and laced varieties, because of



FEATHERS OF THE ERMINE COLOR PATTERN

1—female wing primary; 2—male wing primary (with undesirable white in wide web); 3—male neck hackle; 4—female neck hackle; 5—male front of wing; 6—male front of wing lower down; 7—male edge of wing still lower down; 8—female breast (white surface, very light slate bar); 9—male wing bow (white surface); 10—male front of saddle (barely ticked); 11—saddle small—sharper stripe; 12—saddle large—good stripe; 13—male tail covert; 14—female tail covert; 15—male wing secondary; 16—male smaller sickle.

the difficulty of getting females in these that are equally good in color of back and breast. Generally, when the breast is perfectly marked the back is too heavily marked, and there is more or less dark color intermixed with the lighter ground; and when the back is perfectly marked the markings on the breast are weak, giving it a faded, washed-out look.

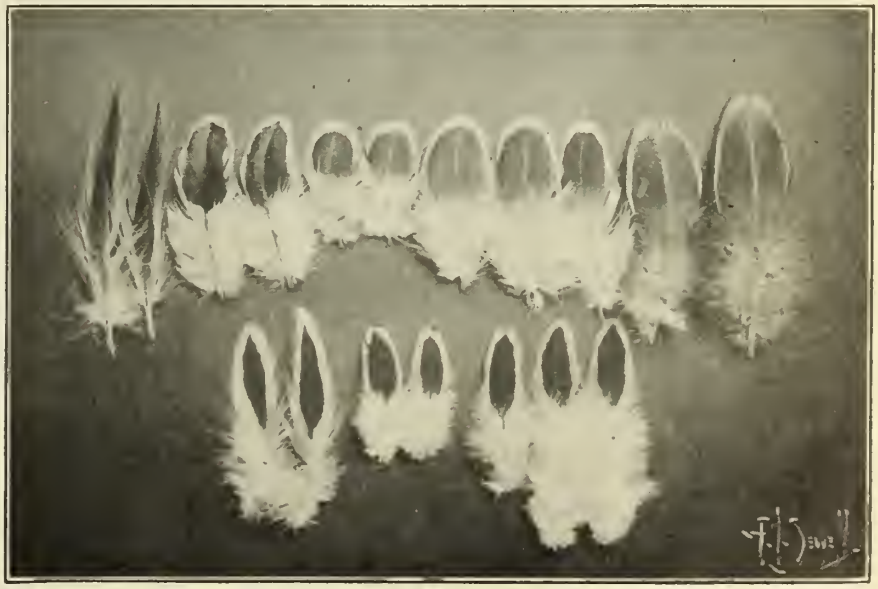
BLUE LACED FEATHERS

It is commonly supposed that solid-colored birds are much easier than others to breed to the perfection of color. As to black-and-white birds this is measurably true, though to secure the finest natural color in either calls for more skill in breeding than most breeders possess. As has been stated, white and black are not absolutely pure colors, and to breed them to perfection—to get clean white, and a black that is solid all over the bird and has a perfect lustre—is very much of an art.

Buff, red and blue are really particolors, and are as difficult to manage as any of the complicated color patterns. Buff and red are made by an even distribution and mixture of the black and red in points too small to be visible to the eye, on every feather; blue by a similar distribution of black only. When a color pattern has two shades of one of these colors, as in laced buff and blue, the difficulty of breeding for it would appear to be increased. But, as a matter of fact, where the contrast in colors is as dull as in these combinations, slight color faults are not nearly as conspicuous as in clean buff and blue, both of which are so difficult to obtain that specimens sound in color in every section are very rare.

Relation of Undercolor to Surface Color

The undercolor in plumage is the color of that part of the feather that does not show on the surface of the bird. In general, the undercolor is less intense than the surface color, and in feathers marked with a pattern, this is less distinct in the undercolor and may disappear altogether. Good undercolor — that is undercolor that appears as a slightly lower grade of the surface color and markings—is characteristic of all highly bred stock, but that is the result of breeding for this point; there is not an absolutely necessary correlation of good undercolor with the surface color. This is seen plainly in newly made varieties, and sometimes also in old, long-established color patterns. The early Buff Leghorns at first had nearly white undercolor. This might be expected in the lightest buff specimens, but it was by no means limited to such. Many of the specimens that—though uneven in color—were almost dark enough to be called red, had as white undercolor as the light buff birds. In the ermine color pattern, where it is desired to have a white surface except in the few marked sections, the undercolor is mostly darker than the surface. In general, strong undercolor goes with strength of black in the black sections and markings, though this is not an invariable rule. Occasional specimens are found that are absolutely white in undercolor, yet strong in all external black points. Such birds however, are apt to prove disappointing as breeders when mated on their surface values, for they have not enough pigment to supply any lack of it in the other half of the mating. Also, if a bird of this color pattern has good black markings with white undercolor as a cockerel or pullet, the probability is that as a cock or hen it will have failed so much in surface color that its value for exhibi-



WHITE LACED RED FEATHERS

tion will be greatly depreciated, and its value as a breeder will depend on what is available to mate with it to restore strength of color.

The Rhode Island Red has much the same characteristics of color, but with the black restricted to the tail and wing feathers, and to a slight ticking at the ends of the hackle feathers of females. The shade of undercolor now preferred is a red or salmon, but in the darker birds there is a strong tendency to slate in undercolor. In both this and the ermine type the slate in undercolor may take the form of a dark bar across the feather—not a clear-cut bar, but heavy in the middle and shading into lighter slate at either side. There is much difference of

SPECKLED FEATHERS COMBINING SPANGLING AND MOTTLING

opinion among breeders as to the advantage of maintaining this bar as a feature in undercolor. Some regard it as a desirable method of maintaining a surplus of pigment. Others abhor it because, unless the stock having it is bred with great care to avoid its appearance in the surface color, it is likely to crop out in black flecks and spots in the web of the surface.

In Barred Plymouth Rocks the practice of breeding to secure strong barring to the skin in undercolor has been extensive, and has led to the acceptance, as correct standard color, of a surface effect much darker than formerly prevailed; for, though individual specimens, or a family for a short time, may show strong surface color with weak undercolor, or undercolor equal to surface color, eventually the normal state with undercolor a little lighter than surface color will be established. Then if the breeder persists in breeding to secure clearly marked and strongly pigmented undercolor, a darker surface will be the rule. On the other hand, experienced breeders always maintain a moderate strength of undercolor as a reserve of color, and as a margin of safety when it is necessary carefully to preserve a balance of surface colors at a certain point.

Concerning the Further Multiplication of Varieties

The making of new color varieties and of rose combed subvarieties of single combed breeds constantly engrosses the attention of a considerable number of breeders. It is to be anticipated that as the number of skilled breeders increases more and more new color varieties, having the quality which will warrant recognition as Standard varieties will appear. To the present time the principal restrictions on the production of good new varieties have been the lack of skill in the breeders making them, the tendency to present them to the public in a very crude state, poor judgment in regard to the attractiveness of a particular color to the general public, and finally lack of capacity to exploit and persistence in pushing a new breed or variety. This combination of obstacles is so strong that it is only at long intervals that anyone succeeds in perfecting and popularizing a variety that can secure recognition wholly on its own claims to attractiveness and novelty in color.

The tendency is for new color varieties with the same pattern to appear in a number of different breeds at the same time. When the causes of this are analyzed it appears that the most favorable conditions for the introduction of new varieties are found when established varieties of old breeds are losing popularity. In discussing the multiplication of breeds at the close of the preceding chapter it was stated that the decline of popularity of the Cochins helped the Orpington. The observation may be extended to apply to the decline of popularity of other Asiatics in the nineties and to the interest in a large number of the color varieties which appeared at that time.

As long as the Asiatics were popular and well distributed few varieties appeared in other breeds with the colors that had been established in Brahmas and Cochins. But when interest in the Asiatics declined there immediately came the development of new varieties of other breeds with the colors of the Brahmas and Cochins. Buff Leghorns, Buff Plymouth Rocks, Buff Wyandottes, Buff Orpingtons and Rhode Island Reds, furnished a whole new series of types in Buffs for those who liked buff color. Partridge Wyandottes and Rocks followed the Partridge Cochin, Silver Penciled Wyandottes and Rocks followed the Dark Brahma and Columbian Wyandottes and Rocks followed the Light Brahma. In all these cases the introduction of a new variety was not the introduction of a novelty in color, but simply the production in a popular breed of a color pattern of proved attractiveness.

Anyone familiar with the history of breeds and varieties of fowls in this country can predict with reasonable certainty whether a new color variety can be popularized at any time and the probable extent and duration of its popularity. The one "factor" that may possibly upset predictions as to immediate popularity is a promoter of exceptional ability pushing a new breed or variety.

With regard to varieties differing in form of comb, the attitude of the public is not so easily predicted. In general it takes readily to rose comb varieties of breeds that originally had a single comb, yet it has persistently refused to accept a Rose Comb Plymouth Rock, and shows very little interest in the Rose Comb Orpington. It regularly rejects the pea comb except as a breed character. If a breed is established with a pea comb, any other style of comb is regarded as inapproprite for that breed, but the most persistent efforts have failed to popularize a pea comb variety in breeds having single and rose comb varieties.

CHAPTER IV

Laws of Reproduction and Improvement by Selection

What the Common Phenomena of Inheritance Show as to Transmission of Characters from Generation to Generation and of Possibilities of Improvement Through Selective Breeding—Prepotency, a Quality of Paramount Importance to the Breeder, Appears Occasionally as an Individual Characteristic, But More Regularly as an Attribute of Good Breeding.

Heredity and the Phenomena of Inheritance

HEREDITY is the transmission of characters in the reproduction of living things. Every organism receives directly from and through one or two parent forms an inheritance of racial and individual characters. The most familiar instances of reproduction from a single parent form are found in the self-fertilizing plants in which the two elements whose conjunction is necessary to produce the fertile seed from which a new plant will come, are found in the same flower. But in many of the lower forms of animal life every normal individual is complete in every function, and at maturity is capable of reproducing its kind independently.

WILLIAM COOK
Originator of the Orpingtons.

Reproduction from a single parent is the primary mode of perpetuating species. Going back of the method of reproduction from a single seed or embryo produced by an individual parent without fertilization by another of its species, we find a method of reproduction by division of the body of an animal or vegetable organism. A familiar example of this is the propagation of plants, shrubs and trees by slips or cuttings, by sprouts from the roots, or by tips bending to the ground and taking root. The interest of these forms of plant propagation for the poultry breeder lies in the fact that systematic line breeding, which is the method by which great excellence in any character or combination of characters is fixed and made a race or strain quality, aims to do in the reproduction of organisms having two parent forms precisely what Nature does in the case of those having only one parent form—to restrict the action of heredity to fixed lines.

Reproduction from a single parent form does not result in exact duplication of the parent in the progeny. There are always individual differences—variations. It is a matter of common knowledge that even in the smallest and simplest structures no two things are ever exactly alike. However they may appear to ordinary observation, a careful comparison invariably shows many little points of difference. In reproduction from two parent forms the uncertainty of the transmission of particular forms of a character, or degrees of a quality, are much increased. An organism derived from a single parent may be conceived of as duplicating the parent with no greater variations than are common in the slightly unsymmetrical development of the parts of an organism which are in pairs. But in reproduction from two parents it is self-evident that when the parent forms differ the progeny cannot possess in their full development all the attributes of both.

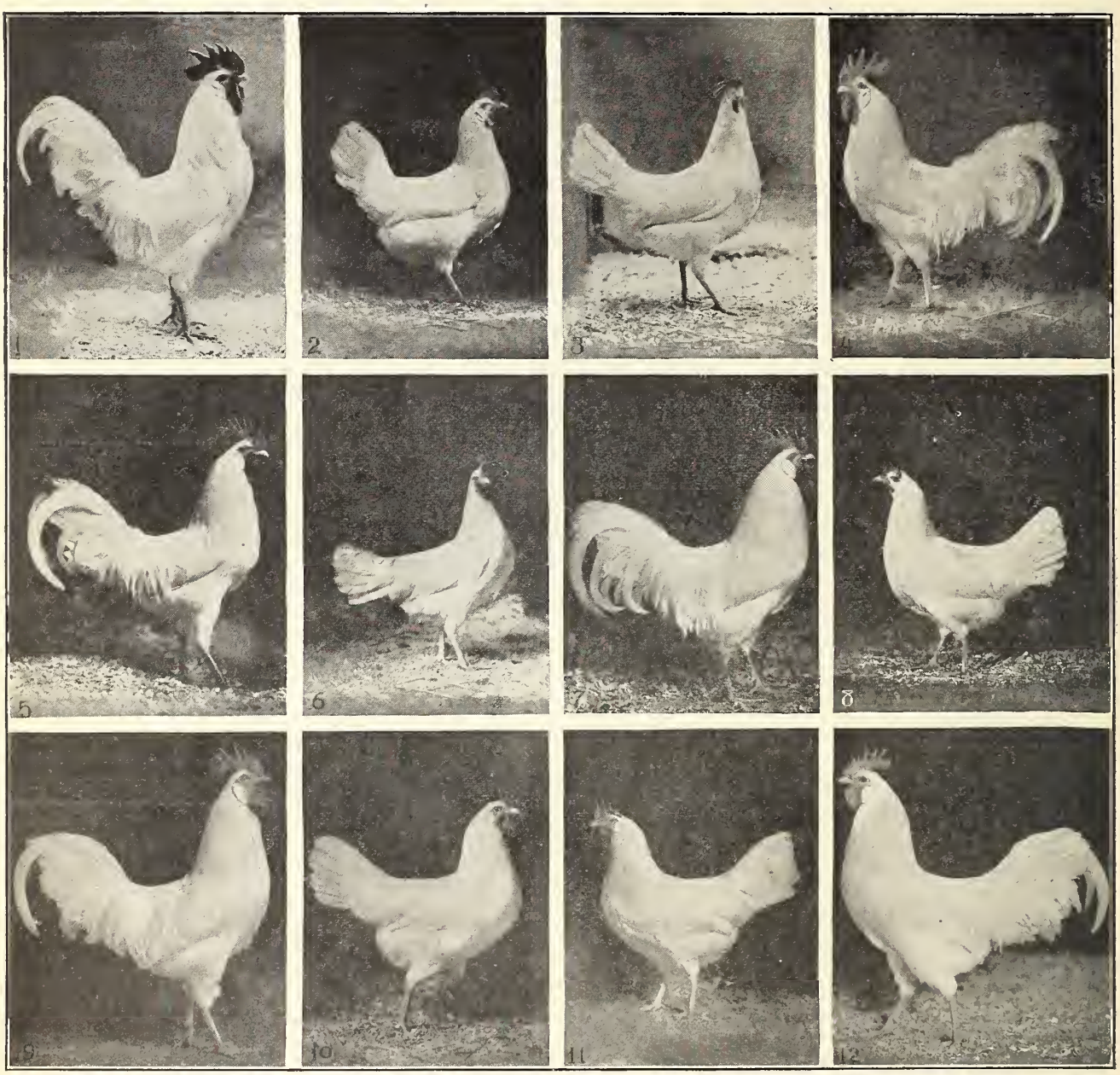
Proportionate Influence of Ancestors

We know from ordinary observation of families of human beings, and stocks of common domestic animals and birds, that an individual may inherit any character of either parent; or may have any character in which the parents differ in an intermediate form; or may exhibit some character in an intensified or an exaggerated form; or may exhibit characters of grandparents or of still more remote ancestors, doing so etiher in the form in which some ancestors had it or in any one of many modified forms. But we cannot learn from ordinary, casual observation that these things do not come altogether by chance. Unquestionably there is a large element of chance in their occurrence where the union of parents takes place without regard to the preservation or development of particular characters. Also the total progeny produced from any mating is usually so much less than the total possible offspring—so few of the germs produced by either parent produce offspring; and the development of individuals is so much influenced by environment and circumstances; and so little is usually known of the pedigree of many of our domestic animals, that the way of heredity seems to be quite promiscuous, and independent of fixed laws.

But as soon as the appearance or absence of any particular character is made the subject of systematic observation in large numbers of individuals and for three or more generations, it appears that the prime cause of uncertainty in the inheritance from two parents is the continuing influence of grandparents and more remote ancestors on the production of characters not discernible in the parents. It is this that makes success in breeding to any type or standard depend so largely upon thorough knowledge of the stock used for several generations. Because grandparents to the third and fourth generation do commonly contribute some appreciable and recognizable part of the heredity of an individual, and more remote ancestors do so occasionally, we have to consider that—whereas, an individual produced by a single parent could have in the five preceding generations only five ancestors, all of the same "blood" and nearly identical in type, an individual produced by dual parentage might have in the five preceding generations SIXTY-TWO DIFFERENT ANCESTORS contributing appreciably to it's composite of characters. Under such conditions the possibilities of variation are practically unlimited. Hence in promiscuous breeding extreme variability is the rule.

The probable influence of any particular ancestor may be calculated. It has been determined statistically, by observation upon the transmission of particular (and usually peculiar) characters, that an individual of dual parentage will, as a rule, inherit one-half of its characters from each parent line; that of the one-half of its characters coming from and through each parent, half (or one-fourth of the whole) is that parent's direct contribution to the inheritance of its offspring, and the remainder is the line or race, contribution of characters that comes through it; that the earlier generations have a steadily diminishing influence, until in the sixth generation back it becomes negligible. Thus the two parents contribute each 1/2, the four grandparents, each 1/16, the sixteen great-grandparents, each 1/256, and the thirty-two great-great-grandparents, each 1/1024.

Expressing this in terms of present desirable characters and absent undesirable characters—which is the way they are considered in practical breeding—it means that if a desirable character is possessed by both parents, but is an individual character in them—not found in the ancestry of either, it will be reproduced in half their offspring. But if the character while common to both parents is found regularly in the ancestral line of one of them, it will appear in three-fourths of their offspring. If the character occurred regularly in both ancestral lines it will appear in all the offspring. If it occurred irregularly in one or both parental lines, a small propor-



GROUP SHOWING RESULTS OF LINE BREEDING IN S. C. WHITE LEGHORNS 1905-1918

All these birds are of the D. W. Young strain, now owned by Oak Dale Farms, Austin, Minn. No. 1—1st cockerel Boston 1905, also 1st cock Boston 1906. All the others were 1st prize winners at Madison Square Garden, N. Y. No. 5 was selected by the American Poultry Association committee on Leghorn Standards at St. Louis in 1910 for model of Standard illustration for all Leghorns. No. 6 was in 1st pen at the Garden in 1910. She had a private record of 288 eggs. No. 7 was first of the eight cocks that won all prizes at New York in 1911. Mr. Young refused $1,000 for him. No. 8 was 1st hen at New York 1916-17. No. 9 was 1st cockerel at New York 1914, and was awarded the American Poultry Association's gold medal for best bird in the show. The following winter he won 1st at both New York and Boston, as first of five winning cocks. No. 10—1st pullet at New York 1915. No. 11—1st hen at New York 1915-16. No. 12—1st cock New York 1918.

tion of the offspring will be without it—the number depending generally upon the number and nearness of the ancestors that lacked the character.

The same thing is true with regard to the absence of characters, or more properly of certain undesirable forms of characters. Take the case of twisted flight feathers in the wings, which are equally objectionable in poultry kept for utility purposes and in exhibition poultry. No poultry keeper likes to see birds in his flock that cannot fold their wings smoothly, but must go about with a few of the largest feathers in each wing sticking out as if they had been pulled part way out roughly, with a twist, and left that way. Twisted wings occur most frequently in breeds that have the least power of flight—Asiatic fowls and large ducks are especially prone to this fault. Breeders are generally careful to avoid mating a male and female that have this fault in plain form, but there are many birds that have it so slightly that it may pass unnoticed; and in mating with special reference to some favorite character it often happens that a mating, or a succession of matings, of birds with very slightly twisted flight feathers will be made. In that case, sooner or later a generation will appear with the fault in pronounced form, and perhaps in the major part of the offspring.

How Selection Works in Practice

It is necessary then for the breeder to eliminate the fault. To do so he rigorously excludes from his matings not only every bird with badly twisted flights, but even those that have the least tendency to it. Having been careless about the fault he probably will not know just what birds that do not manifest it have it in a near ancestor. He may suspect certain birds, or certain matings, and be most careful about using stock from those matings. But in any case he has to consider not merely the elimination of this fault, but the preservation of the good points that he has worked hard to secure, and perhaps has had remarkable success in establishing in his stock. The first year after beginning to breed out the fault he may get as much or more of it, even from his selected birds. The second year he will reduce it, the third it will almost disappear, and after that it will give him little trouble, though a few birds in each generation will probably have it; for according to the law of inheritance as given, the influence of remote ancestors—though generally negligible after four or five generations—does come out in an occasional individual for a much longer time. The figures given indicate the usual rate at which characters can be bred into or bred out of stock.

In breeding poultry to complex standards, however, we cannot establish characters one by one. The breeder working with a new breed or one in a crude state may give more attention to some characters than to others, but he must give to each point at least enough attention to keep his stock near the general type or pattern of its breed or variety; and his constant aim must be to have the complete assortment of type, breed and variety characters transmitted from generation to generation as if they were one. That there are no necessary correlations of characters is shown by the ease with which new combinations, patterns and types may be established; yet by breeding always for the same characters in the same combination, the transmission of the complete combination becomes so regular that the characters appear to be inseparable.

While it is easiest to note the phenomena of heredity in the occurrence of the conspicuous merits and faults of stock in the early stages of breeding to high standards, the law applies just the same to the transmission of the grades of character and of quality which have to be considered by the breeder of first-rate exhibition stock. Whatever degree of merit in any character a specimen possesses it is presumed to be capable of transmitting to its offspring, to some perhaps in the measure in which it has the quality, to some in a less degree, and to some in a superior measure—these differences in transmission being governed by the strength of the hereditary tendencies of the members of the other sex with which it may be mated, and by the continuing influence of the ancestors on both sides.

The Quality of Prepotency

While the general course of heredity follows the mathematical law mentioned above, individual plants, animals and birds differ greatly in capacity to transmit their individual qualities and the racial combination of characters to their offspring. This is strikingly illustrated in human families when the children "take after" one parent to an extent that makes resemblance to the other very slight. An individual having extraordinary capacity to transmit its characters to its offspring is said to be PREPOTENT. Some such individuals are prepotent as to practically all characters; some only as to particular characters and qualities. Breeders usually consider prepotency only in connection with the transmission of desirable and valuable characters, but in many cases it takes the form of transmission of weakness and undesirable qualities, and in such cases prepotency becomes the worst fault that a bird can have as a breeder.

Prepotency in a single desirable character, or in a small group of very desirable characters, makes an individual especially valuable to improve those characters in stock of less excellence in them. General prepotency in an individual of high standard qualities gives it extraordinary value as a breeder. If its prepotency extends to the transmission of prepotency, as well as of other characters and qualities, the breeder is able to use it to found a line of extraordinary standard excellence and extraordinary ability to transmit that excellence.

Every breeder who makes a substantial and permanent success in breeding, dates that success from the foundation of a prepotent line of stock—a strain—from which, according to his opportunities and his requirements, he can produce indefinitely similar lines of like prepotency and equal or superior quality. Hence, while the general rule or law of heredity has an interest to the breeder, he regards results by it as the probable minimum below which none of his stock will fall, if he carefully avoids the use of breeders that are prone to transmit undesired qualities. His best effort and thought are devoted to the development of specimens of superior quality that will transmit more than the common share of their quality to their offspring.

What a breeder actually does in establishing such a family or strain is to produce a race in which the blood and characters of the exceptional individual are predominant, and the chances of inheritance from other individuals are reduced as much as possible. By breeding within close lines, the ancestral lines of inheritance, instead of diverging more in each successive back generation, run nearly parallel and frequently converge so that there are as nearly as possible the same conditions of inheritance as in breeding in line from a single parent. Many exceptional individual specimens have been produced from matings of unrelated parents, but it is un-

usual for such to transmit their quality to any considerable part of their offspring. To get uniformity in the offspring of two individuals, the likeness of the parents must be more than individual likeness; it must be family likeness and identity of racial characters. The one-half of the inheritance of the new generation coming from the ancestry back of the parents must be as nearly as possible of the same material as the half contributed by the immediate parents.

It has been customary among breeders to regard prepotency in individuals as a somewhat accidental quality which is of great advantage to the breeder when it appears, but over the occurrence of which he has no control. It is true that a breeder cannot by any known means produce strongly prepotent individuals at will, from a specified mating, at a given time; but that applies as well to the production of any character. The best of breeders meet with many disappointments in the results of their matings, and—on the other hand—they not infrequently have matings produce much better stock than they expected to get from them. No experienced breeder, speaking advisedly, will predict what will come from a particular bird or a particular mating, for no one can say until the test has been made—until progeny have been reared to an age where quality can be judged—precisely what quality will come from a particular combination.

GROUP OF BUFF ORPINGTONS SHOWING WINNERS OF FIRST IMPORTANCE 1904-1919

This group comprises birds from several breeders, but mostly from Owen Farms, imported or bred by them. The exceptions are Nos. 1, 2, 5 and 7. No. 1—a winner at St. Louis World's Fair 1904. No. 2—a winner at New York the same year was of quality about equal to No. 1. No. 3—1st pullet New York 1904. No. 4—1st cockerel New York 1904. No. 5—hen in 1st pen New York 1917, bred by Hugh A. Rose. No. 6—cockerel that made several wins under different owners in New York shows. Was known as the "Joe Pye" bird and was hatched from eggs from Owen Farms. No. 7—a Rawnsley-Shields hen. No. 8—1st cockerel at Boston 1907. Nos. 9 and 10—hen and cock that were used as models for the Buff Orpington color plate in "The Orpingtons", published by Reliable Poultry Journal Pub. Co., 1911, winners of many prizes about that time. No. 11—1st hen New York 1919. No. 12—1st cock New York 1917.

But an experienced breeder can always safely affirm of suitable matings of stock that he knows thoroughly, that with a multiplicity of matings for the same results, made up generally of the same kind of material, the object will be realized in some of the matings, or such progress made toward it that a few years will see the aim accomplished.

To novices in breeding, and to investigators versed in the exact sciences and not widely acquainted at first hand with the work of poultry breeders, this form of uncertainty in results seems to argue a lack of knowledge on the part of the breeder. As to that, it is sufficient to say here that the most painstaking and elaborate efforts of science to supply that lack have not yet put the poultry breeder in possession of any means of more accurate control, or furnished him any knowledge upon which to base definite predictions. What the breeder is sure of is that continuous mating for a definite result will eventually bring that result, if it is within the bounds of possibility. If a breeder selects prepotent individuals to breed from, he strengthens that quality in his stock. But before saying more of individual prepotency, let us see what light consideration of race or breed prepotency throws upon the nature of prepotency in the individual.

Prepotency a Normal Result of Good Breeding

It is a matter of common observation that, almost without exception, individuals of established breeds appear strongly prepotent when bred with mates of mongrel stock. The reason for this is immediately apparent when the influence of the ancestors of the individuals mated is taken into account. The purebred parent's individual and race contributions to the inheritance of its offspring are substantially alike, while the mongrel parent has no fixed character of its own, and its race contribution is a promiscuous lot of characteristics many of which are quite unlike its individual characteristics. What appears then on a comparison of the relative influence of the immediate parents upon the offspring as marked preprepotency in the purebred parent is—in reality—the entirely regular operation of the common law of inheritance. Prepotency appears here as a result of persistent selection for the characters in which prepotency is manifested.

Whether instances of remarkable prepotency in individuals as compared with other individuals of the same race are of the same character and can be explained in the same way, is debatable. There is no question that some individuals greatly excel other individuals of similar if not identical breeding, in the power to transmit characters to their progeny. But it is entirely possible that a full analysis of these cases would show that the difference in prepotency is a normal variation as other differences in characters are, and that like them it occurs with mathematical regularity. Interesting and valuable as such a demonstration would be as a contribution to scientific knowledge, the lack of it makes no material difference to the practical breeder, for the practical working rule for developing prepotent individuals of superior quality is simply:

MATE FOR THE BEST STANDARD TYPE, BOTH IN THE INDIVIDUAL AND IN EACH AND EVERY CHARACTER, REJECTING FOR BREEDING PURPOSES EVERY INDIVIDUAL THAT IS DISTINCTLY INFERIOR OR DEFECTIVE IN ANY STANDARD CHARACTER, AND OFFSETTING THE MINOR FAULTS AND UNDESIRABLE TENDENCIES IN ONE PARENT BY SUPERIOR EXCELLENCE AND STRENGTH IN THE CORRESPONDING CHARACTERS OF THE OTHER.

Considering this rule in the light of what has been shown of the influence of ancestors it is at once apparent that by following it a breeder will, within a few generations, practically eliminate marked inferiority and faults —so far as they depend upon heredity, for they will be absent from both parent lines. The longer the stock is bred in this way the more infrequent will marked cases of apparent prepotency within the stock become; and on the other hand, the more prepotent will individuals from the flock appear when bred elsewhere with stock that has not such careful breeding back of it. So, while there is a stage in the early work of every poultry breeder, and in the early development of every new breed and variety, and of every extraordinary improvement in breed or variety type, when birds of great prepotency are to be diligently sought and every effort made to impress their quality upon their race, eventually well-bred stock is brought to a state where the operation of the common law of heredity in it gives actually better results than were originally due to prepotency.

Possibilities of Variation Through Selection

The rule which has just been given bases the production, maintenance and improvement of specific types of poultry—breeds, varieties and subvarieties—upon the principle that characters and qualities can be modified in any direction, and to any extent desired, by the systematic intensification of ordinary variations. Theoretically this principle applies to all breeds and varieties. It may be affirmed that they could have been made in that way. In practice, however, the principle is applied exclusively only in the finishing of types that have appeared in stock of mixed breeding, or that have been made by crossing different breeds or varieties to get a new combination of characters. The new type, breed or variety may be roughly made by a mixture, or by a number of different mixtures of different elements. But to establish, improve and perfect it there must be careful selection of the specimens nearest the type to reproduce it; and this selection is made on the principle that the cumulative results of small variations can eventually bring about marked changes in characters.

Until within a few years this principle was almost universally regarded by those having any insight into the methods of poultry breeding as absolutely sound; but of late a considerable element in academic scientific work has taken the position that actual marked changes in type occur only as the result of the appearance of individuals possessing new characters, or advanced grades of characters, and that the substitution of the new form for the old comes about not by breeding the new character into the old stock, but through the gradual increase of the exclusive line of the new type, and the culling out of all the others. The implication—not often plainly stated in print, but occasionally voiced in private—is that the skillful practical breeder deceives himself as to the method by which he makes improvements in his stock. The doctrine that improvement and progress in breeding to standards is made only as advantageous "mutations" arise seems to be widely, if not generally accepted at the present time by scientific investigators studying the problems of heredity; and their views have some influence in forming the opinions on the subject of a considerable number of poultry keepers seeking authoritative information upon the subject. For that reason it is essential, before we go farther in the presentation of the principles upon which poultry breeders work, to present concisely and in popular form the facts in the situation.

CHAPTER V

Darwinism and Mendelism in Poultry Breeding

The Darwinian Theory of Evolution Through Slow Changes More Fully Accords With the General Experience of Poultry Breeders Than the Mendelian Theory of Changes Through Sudden Mutations of Type—From the Poultry Breeder's Point of View the Two Theories Are Not Necessarily Antagonistic, and Mendel's Ideas Do Not Supersede Darwin's, But May Be Used to More Fully Elucidate Them.

Darwinism Based On Common Phenomena

DARWINISM is a systematic theory of the development of the forms of life upon the earth from the lowest and simplest forms. It does not attempt to account for the origin of life, but undertakes to show that the natural laws which we plainly see in operation in the development of domestic animals and plants, are sufficient to account for the evolution of all the forms of life from the most minute and simple organisms. Even before Darwin's time the remarkable results of artificial selection upon domestic animals and birds, and cultivated plants, and the many resemblances in wild types, had led naturalists to consider to what extent natural forces or laws might exert a similar power in the modification of old species and the development of new. The distinctive feature of Darwin's work was his evident effort to construct a basis for his theory which would take due account of all pertinent facts, and which would—as far as possible—exclude erroneous observations by practical breeders and fantastic speculations by the more imaginative class of naturalists.

Artificial selection, as has been shown in preceding chapters in this book, aims at the preservation and improvement of favored types—either useful or beautiful. Its method is careful protection of these favored types, with ruthless extermination of others. No evidence of such partiality—as against inimical forces and conditions—by a superior controlling agency can be found in nature. By a comprehensive analysis of things affecting the development and persistence of wild types, varieties and species, Darwin was able to furnish reasonable grounds for assuming that many influences and conditions in nature combined for the preservation of the types best adapted to the existing conditions of life to which each species was subjected, and of the types that most readily adapted themselves to changes in their environment. This result he called "the survival of the fittest."

Doubtful Points in Darwinian Theories

Darwin and other scientists who accepted the general theory which he advanced held that—given sufficient time—the modification of type, of which such abundant evidence was furnished by domestic races, would cause changes great enough to make distinct natural varieties and species. This school of scientists did not overlook or deny the possibility of more rapid changes as a result of the occasional appearance of "sports" differing greatly in some one or more characters from the stock that produced them, but regarded such extraordinary means as exceptional, and held that progress in general was through the cumulative effects of small variations. In this connection there arose a sharp difference of opinion as to the possibility of the transmission of what are called "acquired characters"—that is, characters produced as a result of conditions affecting the organism in life, making it different from the racial type.

Some held that such acquired characters were transmitted; others maintained that they were not—that they could not conceivably be transmitted. This difference of opinion logically divided them on the question of the possibility of the evolution of species by the slow process of cumulative selection of individual variations within any conceivable period of time. If no part of the improvement of characters as a result of more favorable conditions of life—which are often the most marked improvements made in domestic animals and plants—could be transmitted, the period required for an appreciable change in a wild type through the cumulative effect of small, individual, congenial variations became incalculably longer. This was a formidable objection to an essential part of the Darwinian theory of the evolution of species.

Another great objection, not so formidable in itself, but having much weight with those whose acquaintance with matters relating to the question is mostly second-hand and superficial, was the inability of the exponents of the theory of the evolution of species from other species to point to any plain case where this had taken place within the knowledge of men. Variable types there were in nature, and endless breeds and varieties in domestication, but no particular instance could be given of the origin of a species—that is, a race so detached from apparently similar forms that it would no longer produce fertile offspring when bred with any other kind.

Origin and Nature of Mendelism

In 1900 Professor Hugo De Vries, of Holland, announced that in experimental work in plant breeding he had succeeded in finding "a species producing new forms," and "that it has become possible to see species originated, and that this origin is sudden and obeys distinct laws." The "laws" to which he alluded, and which it was said had been rediscovered in his investigations which led to the production of new species, were certain conclusions drawn by an Austrian monk, named Mendel, from experiments in crossbreeding plants. A report of these experiments, with a statement of his conclusions, had been published in 1865, but attracted no attention at that time and was soon forgotten.

Presented at first as supplementing the Darwinian theory, and supplying details which it lacked, Mendelism almost immediately developed into an anti-Darwinian cult, which not only rejected the idea of improvement or marked change in form or development of a character through cumulative selection of small variations, but asserted that in the light of Mendel's discovery—confirmed as it was claimed by several modern scientists—Darwin's whole theory must be reconsidered. Such reconsideration it was declared required first the discarding of most of the technical terms of Darwinism, and led quickly to the abandonment of what may be regarded as the essen-

tials of the Darwinian theory of evolution. Not only was Darwinism condemned offhand, but the posthumous disciples of Mendel and followers of De Vries expressed the utmost scorn for the views and observations of practical poultry breeders, who, as a class, are practical exponents of what can be done through the cumulative results of selection for small individual variations in any desired direction.

Poultry Breeders' Views of the Two Theories

Darwin's theory of evolution, both in general and in detail, is easily comprehended and readily accepted by poultry breeders, because it is so plainly in accord with facts as they appear in breeding practice; and because it is plainly, logically and fairly presented. In fact, as has been said, Darwin's evidence in support of his theory was drawn largely from the common phenomena of breeding domesticated animals, birds and plants. Moreover, the laws which Darwin deduced from the facts he systematically presented have since been widely (almost universally) accepted throughout the civilized world as general principles of the development and growth of every form of human institution and interest.

Mendelism and the development of ideas and theories springing from it are, on the contrary, not readily comprehended by poultry breeders. The nomenclature and phraseology are strange, and the logic of the Mendelists is difficult and often impossible to follow. As presented by Mendel, his laws related only to the behavior of certain characters in crossbreeding and in the breeding together of the progeny of a cross in a few subsequent generations. To the poultry breeder who familiarized himself with the report of Mendel's experiments it appeared to show that the phenomena of inheritance in the descendants of crossbred stock which so often appeared to follow no principle, occur in an orderly way and with apparent mathematical regularity. His experiments and report

GROUP OF SILVER CAMPINE WINNERS 1911-1920

No. 1—pullet of ordinary quality, not much better than a Braekel (the unimproved foundation stock). No. 2—a cockerel of like quality. No. 3—1st cockerel at the Garden 1911, bred and shown by Rev. E. Lewis Jones, Wales. No. 4—hen in 1st pen at Boston about same time. No. 5—1st hen, New York 1911, also shown by Mr. Jones. No. 6—1st cockerel at New York shown by Homestead Campine Farm. No. 7—1st pullet Boston 1916, Homestead Campine Farm. No. 8—1st cockerel New York, 1920, Homestead Campine Farm. No. 9—1st cockerel Palace Show, New York, 1914, Martling Hennery. No. 10—1st pullet Chicago 1915 or 1916, F. E. Hering. No. 11—1st cockerel New York 1919, also 1st cock at Boston 1919-20. No. 12—1st hen Boston 1915. Nos. 11 and 12, both from Homestead Campine Farm. Mr. Sewell, in arranging this group, paid particular attention to matching male and female types in the photographs available, and with special reference to placing his best models at Nos. 11 and 12.

dealt only with the results of crossing supposedly pure races, which in respect to the character under observation were regarded as "opposites"—as tall and short, smooth and rough, yellow and green, and similar pairs of characters. Such characters were also described as "mutually exclusive."

What Mendel Really Did and Learned

Mendel's experiments were made with peas, which are self-fertilizing plants. His first crosses were secured by artificial pollination. In the subsequent generation it was only necessary to allow fertilization to take place naturally to insure that male and female elements of like constitution, both in body and "germ plasm" would unite. From the statement of Mendel's results given by Bateson in an article on "The Problems of Heredity and Their Solution," which the reader desiring more fully to familiarize himself with the subject will find as a reprint in the "Annual Report of the Smithsonian Institution" for 1902, I quote the following, and would ask the reader to note particularly words and phrases in black face type, because these are qualifications of the statements made which are of the first importance in arriving at judgments as to the correctness of the deductions made by Mendel, and by those who later duplicated his experiments:

"For the purposes of his experiment Mendel selected seven pairs of characters, as follows:

1. Shape of ripe seed, whether round or angular and wrinkled.
2. Color of 'endosperm' (cotyledons), whether some shade of yellow or a more or less intense green.
3. Color of the seed skin, whether various shades of gray and gray-brown, or white.
4. Shape of seed pod, whether simply inflated or deeply constricted between the seeds.
5. Color of unripe pod, whether a shade of green or a bright yellow.
6. Nature of inflorescence, whether the flowers are arranged along the axis of the plant or are terminal and form a kind of umbel.
7. Length of stem, whether about 6 or 7 feet long or about ¾ to 1½ feet.

"Large numbers of crosses were made between peas differing in respect of one of each of these pairs of characters. It was found that in each case the offspring exhibited the character of one of the parents in **almost** undiminished intensity, and intermediates which could not at once be referred to one or other of the parental forms were not found.

"In the case of each pair of characters there is thus one which in the first cross prevails to the exclusion of the other. This prevailing character Mendel calls the dominant character, the other being the recessive character. * * *

"By letting the crossbreds fertilize themselves Mendel next raised another generation. In this generation were individuals that showed the dominant character, but also individuals which presented the recessive character. Such a fact was well known in a good many instances. But Mendel discovered that in this generation the numerical proportion of dominants to recessives is **on an average of cases approximately constant**, being in fact as three to one. **With very considerable regularity** these numbers were approached in the case of each of his pairs of characters.

"There are thus in the first generation raised from the crossbreds, 75% dominants and 25% recessives.

"These plants were again self-fertilized, and the offspring of each plant sown separately. It next appeared that the offspring of the recessives remained pure recessive, and in subsequent generations never produced the dominant again.

"But when the seeds obtained by self-fertilizing the dominants were examined and sown it was found that the dominants were not all alike, but consisted of two classes: (1) those which gave rise to pure dominants, and (2) others which gave a mixed offspring, composed partly of recessives, partly of dominants. Here also it was found that the average numerical proportions were constant, those with pure dominant offspring being to those with mixed offspring as one to two. Hence it is seen that the 75% dominants are not really of similar constitution, but consist of twenty-five which are pure dominants, and fifty which are really crossbreds, though like the crossbreds raised by crossing the two original varieties, they only exhibit the dominant character.

"It was found that by self-fertilizing the original crossbreds the same proportion was **always approached**—namely, 25 dominants, 50 crossbreds, 25 recessives, or 1D: 2DR: 1R.

"Like the pure recessives the pure dominants are thenceforth pure, and only give rise to dominants in all succeeding generations studied.

"On the contrary, the fifty crossbreds, as stated above, have mixed offspring. But these offspring, again, in their numerical proportions, follow the same law—namely, that there are three dominants to one recessive. The recessives are pure, like those of the last generation, but the dominants can, by further self-fertilization, be again shown to be made up of pure dominants and crossbreds in the same proportion of one dominant to two crossbreds.

"The process of breaking up into the parent forms is thus continued in each successive generation, the same numerical law being followed so far as has yet been observed.

"Mendel made further experiments with peas, crossing pairs of varieties which differed from each other in two characters, and the results, though necessarily much more complex, showed that the law exhibited in the simpler case of pairs differing in respect of one character operated here also."

The critical reader at once notes two things in the foregoing statement: first, that the different characters compared in pairs by Mendel were in a number of cases not so sharply contrasted that the degrees of difference between them would be strongly marked, or that intermediates would be conspicuously different from either parent form; and, second, that whereas Bateson in the first place qualifies the assertion of absolute uniformity of results, and reproduction of the characters only in one of the forms typical in the parents, afterwards he drops qualification and refers to things that are measurably so, or usually so (in the case cited), as if always and positively so. This habit is characteristic of the greater number of those who have advanced and sought to establish ideas based upon Mendel's work from that day to this.

"Mendelian" Experiments With Poultry

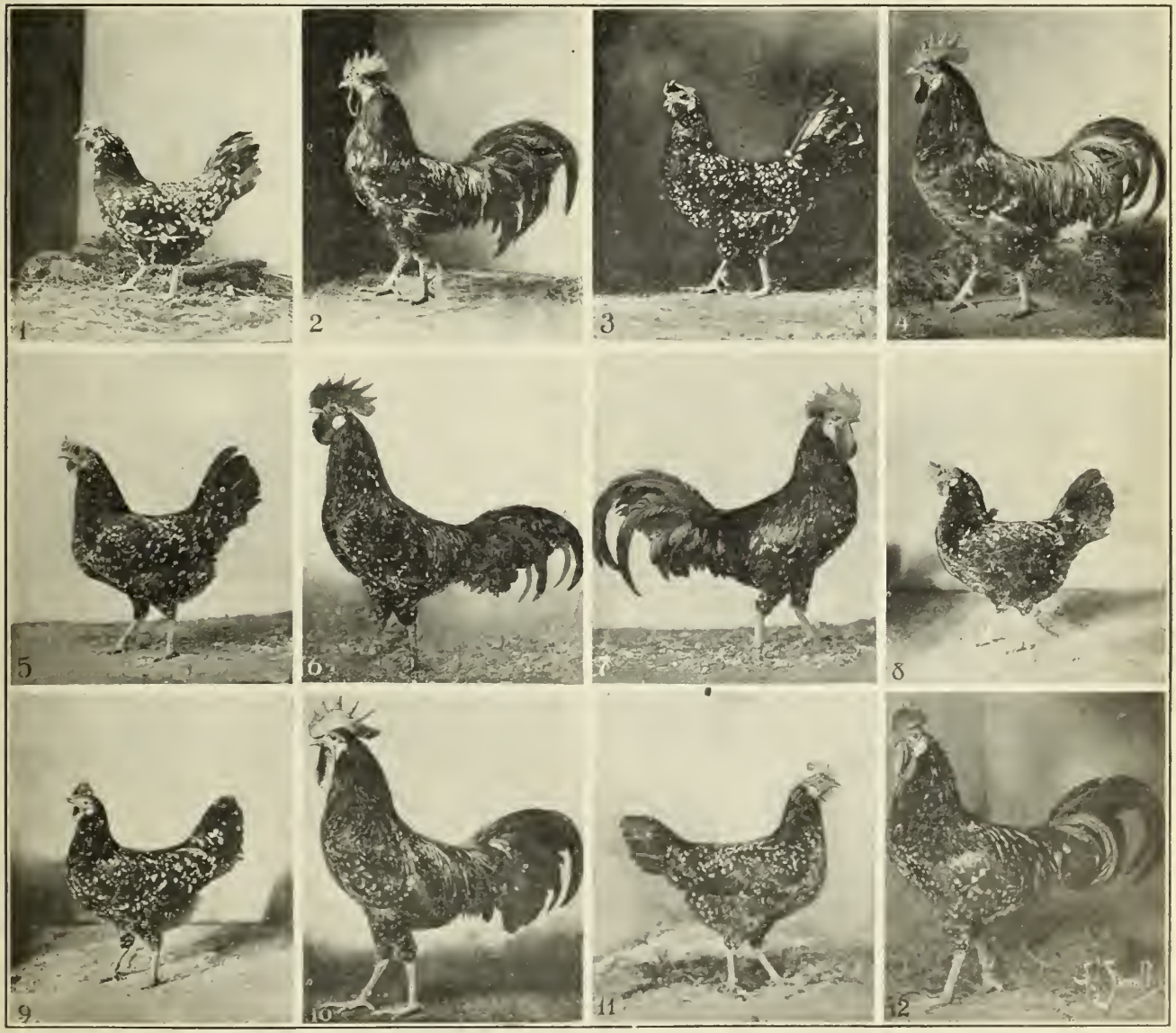
Reconsideration of the problems of heredity in the light of Mendel's report of his work, and generally for the purpose of confirming his deductions and making them in some sort a basis for new theories, began with enthusiasm. One of the first moves was to demonstrate the laws in small animals and poultry. Reference will be made here only to experiments with poultry. These were not undertaken in the first place for any practical value they might have for breeders but for the additions that might be made to scientific knowledge. In poultry the investigators found a wealth of material with strongly contrasting characters. From the outset their experiments, whether on a large or on a small scale, were reported as immediately confirming Mendel's results and laws. This was marvelous—not to say miraculous—when it is considered that the experimenter with poultry did not have the advantage of self-fertilization in individuals to insure that in mating the first crossbreds and their descendants the two elements necessary to produce a new individual would invariably come from parents of like constitution.

Among the first poultry characters experimented with were rose comb crossed with single comb, black color crossed with white, crested birds crossed with noncrested. It was stated that in the cross of rose and single comb only rose combs appeared in the first generation from the cross, and that in the other cases white was dominant over black, and crest over no crest. Taking the statements of Mendel's results literally this meant that all the crossbreds had typical rose combs—exactly like their rose-combed parents; that all the birds from the color cross were pure white; and that the crossbreds from the cross of crested and noncrested birds had the full-sized typical crest of their crested parent.

Now the present younger generation of poultry breeders in America has perhaps not had much experience with crossbreeding; but those whose breeding experience began in the 'nineties or earlier had seen a great deal of it, and were quite familiar with the results of almost every cross that could be made with strongly contrasting poultry characters. And these old breeders knew that when rose and single combs were crossed the usual result was an intermediate form, that was a nondescript, neither good single nor good rose. They also knew that the crosses of black and white birds often produced offspring in which white was the prevailing color, not pure, but more or less flecked with black, and that nearly black birds, barred birds, and blue birds might also come from this cross. With regard to the crossing of crested and noncrested fowls they knew that the usual result was a crest much reduced in size. Many of them who had experimented with crosses for special purposes also knew that what breeders call prepotency had a great deal to do with the results in crossing, as well as in pure breeding, and that similar crosses did not always give the same results.

Unscientific Methods of Some Scientists

Most breeders who heard the case stated immediately rejected the matter as too grotesquely improbable to be given serious thought by men who knew the common phenomena of breeding. To those who followed up the



GROUP OF ANCONAS SHOWING IMPROVEMENT OF TYPE AND FINISH IN A FAMOUS LINE

All birds in this group were bred and shown by H. C. Sheppard. Nos. 1 and 2 show the style of birds with which he began and which could then win at New York. No. 3 was a Garden winner 1915-16; No. 4—a winner at the Forest City Fair, Cleveland, 1914. Nos. 5 and 6 are respectively 1st pullet and 1st cockerel at New York 1916-17. No. 7 was first cock at New York 1916-17; No. 8—1st pullet at New York 1919; No. 9—1st hen at New York 1919; No. 10, a 1918 winner; No. 11—1st hen at the Garden 1920; No. 12—1st cockerel at the Garden in 1919, and 1st cock there in 1920.

matter it was eventually apparent that the Mendelian investigators' analyses of their results which led to such descriptions of them were due to the crudest sort of observation and to false reasoning. The investigators called nondescript combs rose combs because they were plainly not single. They described any bird as white that was anywhere near white; and any bird as typically crested that was not absolutely free from crest. And so in all characters that were compared.

The early observations were all (so far as the writer has been able to learn) on very small numbers of birds. Later some elaborate experiments were made, and in many of the minor observations considerable numbers of chicks were reported as having been observed; but in some of the most important experiments the birds used as representative of pure breeds were plainly not suitable for the purpose, while to avoid the drudgery and trouble and expense of rearing large numbers of chickens to an age at which their permanent characters, and the grades of those characters, could be properly determined, numerous investigators adopted the plan of incubating the chickens only until they were ready to pip the shells, then removing the heat so that the chicks would die at that stage, and describing comb, color, and other characteristics from unhatched chicks. To all the other objections to this practice there was added the objection that such use of material made verification of reports absolutely impossible.

Such things as these discredited the results of investigation and study along "Mendelian lines," for though there were numerous investigators whose own work was above suspicion, and whose reports and discussions of it were fair and reasonable, the general custom among scientists of giving full credence (at least in utterances for the general public) to each other's results has in most cases been followed so far that the good and bad, the true and false, in this line of work are too closely intermixed for anyone not quite familiar with the whole subject and with the merits of the work of each of those who have investigated along these lines to separate them.

Value of Mendel's Discovery to Breeders

Notwithstanding the faults of investigators and their misinterpretations of the results from first crosses of contrasting characters, the discoveries of Mendel as to the behavior of the characters in the descendants of crossbreds may be of considerable value to the breeder. Even at superficial consideration the formula appears to resemble the general law of inheritance (commonly called Galton's Law) stated in the last chapter: that an individual derives one-fourth of its inheritance from each immediate parent, and one-fourth from the prior generations of each parental line. In the second part of Mendel's law the factors one-fourth and one-half again apply (as follows naturally from the fact of dual parentage), and Mendel's observations do bring in a possible element of certainty in the transmission of characters which is not supplied or suggested by any other theory.

The general law (as understood and held) is that the individual will on the average inherit its characters in certain definite proportions, but as to what will occur in any particular case it tells nothing. Mendel's observations on the progeny of his crossbreds indicate that a part of the crossbreds may be pure for the character of one parent, a part for that of the other, and that the remainder will be like their crossbred parents—producers of crossbreds and of purebreds of both types. That is, there is a main line of crossbreds regularly throwing off in each generation two side lines, the one pure dominant, the other pure recessive. Such a result is entirely reasonable, and its reasonableness is not dependent upon the correctness of the Mendelian theory of the behavior of characters in the progeny of a cross, nor is it dependent upon the Mendelian idea (which presently will be further considered) that characters are transmitted unchanged.

One of the most common phenomena in the breeding of rose-combed fowls, and especially of those with medium to small rose combs, is the production of birds with good single combs. And, as far as has been noted in the ordinary operations of breeders who have used them, these single combs breed true. This appears to be a case to which Mendel's observation that his "recessives" upon appearance in any generation, bred true (were pure for the character under consideration), will apply. The occasional occurrence of white sports in modern times might be explained in the same way for some cases, though it would also appear from some of the results obtained at the Maine Experiment Station to which the Mendelian formulas were applied, that certain crosses of colored birds would, through the combinations of factors in Mendelian modes, produce a definite, small proportion of white specimens. And the frequent recurrence of markedly off-type specimens in well-bred stocks may be parallel cases. To determine the facts as to any of these points requires quite elaborate observations covering a long term of years, and a combination of practical experience in breeding and scientific education and training that has not been possessed by any of those who have as yet engaged in investigations along this line.

Obstacle to Use of Mendel's Formula With Poultry

The great difficulty in any undertaking to duplicate in poultry the work Mendel did with peas, is to make matings of individuals of like constitution. It is perfectly plain that if although the dominants all look alike, only one in three of them is actually purebred and will produce only dominants, the mating of purebred individuals becomes a matter of chance, with the chances always two to one that whether the birds mate at random or are mated by the breeder a pure and an impure dominant will be brought together, an occurrence which Mendel dealing with self-fertilizing plants did not have to consider.

Theoretically the only class of cases under the Mendel formula that gives the breeder anything more definite and certain than he had before are the cases of reappearing recessives. Applied in the ordinary course of breeding this would mean that if we wanted a particular form of character to breed always true, the way to accomplish it would be to cross with some other form of the character to which it was found to be recessive—to eliminate it in one generation and breed from the birds in which it reappeared in the next. This method might be suited to the work of establishing characters in new breeds and varieties in their crude form, but it is a temporary inversion of the rule that like begets like, and notwithstanding all the alleged evidence that recessives ever after breed true, it has not yet been shown that such is the case. When the method of line breeding is taken up in the next chapter it will be shown that inbreeding for quality in characters which gives valuable and stable results is based on the principle that unlike characters in the ancestry are to be scrupulously avoided.

Extent of Application of Mendel's Law

While the Mendelian formulas were at first said to apply only to a certain class of cases of crossbreeding, it was soon recognized that if they applied at all they might apply to any character or quality. It followed logically from this also that they might apply to grades of character—to individual differences. And though this was sometimes half-admitted by the exponents of Mendelism, with a singular inconsistency they clung to the fiction that there were no intermediate forms of characters, but that where characters differed in individuals mated, the offspring in the first generation would follow one parent, and when bred among themselves would produce no intermediate or blended forms, but the forms or grades of the character as possessed by the two parents in Mendelian proportions.

This appears to be the orthodox attitude. The writer is trying to state it fairly on his understanding of the ideas of a number of the men who have been prominent in this line of investigation, but will say frankly that there are frequent incompatibilities in the views expressed by the same authority, and that it is often impossible to say from consideration of the statements of a man upon different points at different times, or in different connections, just what view he holds. This situation may be regarded as an unavoidable phase of the transition from the consideration of Mendel's formulas as of limited application to recognition of whatever may prove to be valid in them as of general application. It should be observed also that among those who have applied Mendel's formulas in their investigations of problems of inheritance there are many variations and modifications of the ideas commonly classed as Mendelism.

But allowing for these things it still may be said that Mendelism as contrasted with and in a measure opposed to Darwinism, represents the view that characters are not changed by gradual modification through selection, but as a result of the occurrence of new types and species formed by instantaneous changes, called mutations, which reproduce themselves faithfully, but which will not blend with the older race characters. To an experienced poultry breeder all such ideas appear as the vagaries of men who with knowledge of many things out of the line of common information lack understanding of the practical facts relating to inheritance. There are no phenomena of breeding that stand out more plainly to the breeder who knows how to accomplish definite results than the variability of characters, the existence of grades of characters, the blending of characters in intermediate forms, and the development of characters by the systematic selection of variations in the desired direction. The poultry breeder breeding to a high standard of excellence in a complex and highly finished type is applying the principle of selection—of modifying characters slightly or considerably, as he wishes, by blending them with other characters in such a way that the strength of one side of the mating offsets weakness in the other, or the union of two strong characters gives something a little stronger than either in the progeny. He applies the principle not to a few pairs of characters that are conspicuously different, but to all characters.

Observations On Crossbreeding Insufficient

The trouble with the majority of the scientific investigators who have exploited Mendelian ideas which go contrary to the experience of practical breeders has been that their interest has been focused too exclusively upon the crude results following crossbreeding from radically different types. With a few notable exceptions they have not shown enough appreciation of values in finished poultry types to analyze the individual differences in birds of the same general type. The exceptions invariably lean more and more toward the essential things in the Darwinian theory, though it appears to be a hard thing for the modern investigator accustomed to the ideas and the phraseology of the Mendelists to realize where he is when he has admitted a few facts not according to orthodox Mendelism.

Persistency in considering unit characters as indivisible things which must be transmitted as they are, or not at all, is a necessary consequence of the effort to uphold the idea of evolution through marked mutations only. Every admission that characters are slightly variable, or that the union of two markedly different forms of a character may produce an intermediate form, or that different individuals vary greatly in the proportions in which they transmit the quality or grade of a character which they possess, counts against the doctrine of evolution through marked mutations and leads back toward the Darwinian doctrines of selection and prepotency. The whole subject has been confused in the minds of most of those who, either as scientists or as seekers for information, have taken an interest in it, by the misuse of old terms and the introduction of new terms and phrases that were easily misunderstood and misapplied. Thus, when De Vries declared that he had succeeded in producing new species he had done nothing of the kind, but had only produced new varieties, which is a very common and a comparatively easy thing to do. But following this misuse of the term species it became customary to apply it to varieties, and also to describe as a hybrid the perfectly fertile progeny of ordinary crossbreeding.

Such misuse of terms and the introduction of new terms of strange composition to represent things which could just as well have been called by common words with whose meaning everyone would be familiar has tended to make old facts unrecognizable in the new dress given them, and given greater semblance of originality to ideas that are largely old speculations in new dresses. While Darwinism, with one of its deepest roots in the knowledge and practice of live stock breeders, almost immediately had a marked effect upon breeding practice, giving back to the breeders in more serviceable form, and improved and enlarged, what it had found in their experience, Mendelism has really never so much as obtained a hearing with most experienced practical poultry breeders. The writer does not undertake to say whether or not it has a better standing with breeders of other classes of live stock, but as far as his information goes it has not. There have been a few breeders who have claimed to be able, by applying Mendelian formulas in their breeding, to get remarkable results, but as far as details of their operations have been published their methods were not applications of those formulas at all.

From what has been said of the underlying truth in Mendel's observations, and in all carefully conceived and accurate work in which his formulas have been used, the reader will rightly infer that in the author's opinion the interest in Mendel's results and theories will eventually lead to experimental work that, instead of laboring to discredit the principles upon which progress in breeding has been made in the past, will show the true relation of Mendel's discoveries to the application of the principle of selection.

CHAPTER VI

Principles of Line Breeding and Inbreeding

Technical Definition of Line Breeding—Origin and Duration of Lines or Special Families — How Breed and Line Differ—Line Breeding the Means, Not the End—Old Scientific Prejudice Against Inbreeding Due to Lack of Information—Modern Scientific Opinion Regards It as Essential to Results and Not Necessarily Harmful—Starting New Lines with Like Mates and with Unlike—Relation of Inbreeding to Practical Qualities.

Line Breeding Defined

AS a technical term in the poultry breeder's vocabulary, line breeding means just one thing. What that is may be best explained by showing first what the poultry breeder calls a line.

In Chapter IV it was shown that ordinarily an individual inherits only half of its characters from its two immediate parents, the other half coming from more remote ancestors, and a frequent phenomenon being the particular resemblance of an individual to a grandparent. This phenomenon of alternate inheritance — the disappearance of characters in one generation and reappearance in the next—is scientifically interesting and of use in determining principles of breeding; but in breeding practice it is a disturbing element—an uncertain factor of sometimes alarming energy.

The desirable and valuable individual for breeding purposes is the specimen of all-round excellence that transmits this excellence to its progeny to the exclusion of individual characteristics absent in it, but existing somewhere in the ancestry. When the descendants of such birds show the same prepotency, the quality of direct transmission appears to be fixed as characteristic of the family, and a line of known breeding quality is established. LINE BREEDING IS SIMPLY BREEDING, FIRST TO GET AND IDENTIFY, THEN TO MAINTAIN AND USE TO THE BEST ADVANTAGE, SUCH LINES, FAMILIES, OR SPECIALLY IMPROVED STRAINS.

Origin of Lines

The actual origin of a line of marked prepotency, and with the habit of direct transmission of all conspicuous characters, is probably in most cases from a single hen; but the fact can only be known where single pair matings or trap nesting enable the breeder to identify the dam as well as the sire of specimens that attract attention for quality and prepotency. A line that originates from a mating in which the object was to reproduce as nearly as possible the combination of characters in a particular hen, usually takes its name from that hen; and such a line is usually very carefully developed, starting with a single mating of that hen with the male that it is thought will mate best with her for the purpose. As a rule, the sire or a brother of a highly bred hen is most likely to contribute the male elements required for the most exact possible duplication of her type; but when a hen of remarkable quality appears in a stock of ordinary breeding, or when her breeding is unknown, the breeder will select a male of the best breeding that he has or can find, that seems most suitable to mate with this particular hen.

Not infrequently it happens that valuable lines are developed from birds that with excellent quality in most characters have some fault that bars them from the general matings of a breeder—the matings from which he sells eggs for hatching. Novices in breeding generally suppose that the thing to be especially avoided is the use in the breeding pen of specimens that would be disqualified for exhibition. That depends on the reason for disqualification, the general quality of the bird, whether eggs from the pen containing it are to be sold for hatching, and upon whether the breeder knows how to mate to offset the defect, or can afford to grow a perhaps excessive proportion of culls from a specimen and its descendants for a few years for the sake of getting extraordinary value in the birds of the line that are right in every way.

It has been shown that any fault can be bred out by selection and proper mating, so that within a few years it will rarely appear. It often happens that a bird that excels all others produced by a breeder in a season, at nearly every point, has one bad fault which mars its appearance and disqualifies it for exhibition. It may be a little thing, as the absence of the spike on a rose comb, or a tendency to carry the tail to one side. Many birds that show this slightly at home, and are not positively wry tailed, will at a show where they are kept in a small coop, and excited more or less, becoming tired and nervous, carry the tail so much to one side that while in this state they are either disqualified for positive fault (so considered by the judge) or, if he feels doubtful about it, are cut so much on shape that they have no chance of a place. Slightly slipped wings, little feathers or down on shanks that should be smooth, and like faults, are common examples of the things for which a breeder of high-class stock excludes otherwise superior birds from his regular matings. But any of these birds may be mated in special matings whose progeny will be kept at home until the fault is so far bred out that the occasional appearance of it in a lot of good chicks will not be considered ground for complaint by reasonable customers. This is the only way such birds can be used, and as the breeder generally needs all the superior birds that have no bad fault for the matings from which he sells eggs for hatching and produces birds to be sold at maturity for exhibition or breeding purposes, circumstances favor the frequent development of lines of extraordinary value from this class of "culls."

In general, however, the most celebrated lines come from exhibition birds of exceptional quality and ability to produce quality; and remarkable male lines—that is, lines producing an unusual proportion of males of high quality and great prepotency—are much more numerous than equally distinguished female lines; for in pen breeding the male always gets full credit for performance while the female side of the credit is the undivided asset of all his mates. Another reason for the greater popularity of lines bearing the name of a celebrated male is that the buyers of birds for breeding mostly want males to improve their stock because in this way they get the quickest general improvement at the least cost. But it really makes no difference whether the bird at the head of the line is a

male or a female. The important thing is first to get a bird of exceptional quality and then to fix that quality—at the same time strengthening it in any detail in which it may be weak—as a family characteristic.

It must be frankly admitted and recognized at the outset that exceptional birds, worthy to become the heads of distinctive lines, and worth all the time and trouble that the breeder must devote to making that line, are rare. They are not produced at all numerously except in the stocks of the "master breeders" who have devoted the best part of a lifetime to a few varieties—many of them to a single variety. The average breeder has to keep for himself most of the birds—especially the females—that would be really valuable to someone else in establishing new lines. Each small breeder has a few such to sell. The large breeders have more; but altogether (taking into account the fact that the first and most profitable demand for this class of birds is for exhibition) there are not nearly enough of them to supply the demand. That is why, through all the lean years in poultry breeding (from 1912 to 1919), first-class birds were always salable at good prices while the ordinary good and inferior grades were going begging.

Why Good Breeders Are Scarce

It is worth while to consider here why very good specimens are so rare and valuable. At the close of the quotation from Bateson, in the last chapter, there is a reference to the complexity of the results when investigators undertake to make observations simultaneously upon two pairs of characters—that is, really only upon two characters in the progeny from the cross in which the different forms of the characters are paired. And this complexity pertains to consideration of each character as a whole—not to its details. In breeding to the "Standard of Perfection" as adopted by the American Poultry Association for a breed or variety, a breeder has to consider every detail and property of every visible character, and also has to have in mind important details of character in their ancestry as far back as he knows it and as it is likely to have an influence upon his results. But leaving ancestry out of the question, in the birds as he mates them the poultry breeder has to consider more than one hundred points in size and shape of the body and its parts; and anywhere from five or six to nearly a hundred points in color—according to the variety and the simplicity or complexity of the color pattern. And points as I use the term here is simply points in standard description. What the breeder actually has to do in consideration of characters goes much farther than that, for consideration of a character in breeding to standard, or in judging according to standard, is not simply a matter of determining whether it has the correct form, color, or whatever the quality observed may be. In breeding—in particular—the kind and extent of the variation from correct type must be noted, and this not simply with reference to one bird alone, but with reference to every corresponding character in its mate.

But taking only the points to be considered, there are in every case from a little more than one hundred to about two hundred of them that must reasonably meet the Standard's specifications to make a good standard bird. It is natural for every one of these points to vary, and it is inevitable that where so many points have to be considered that the breeder should give more attention now to one group of points, now to another, and that occasionally in mating for something especially important he should take chances on some of the less important characters that are best established. He cannot balance all points perfectly in mating two birds. His birds of best quality will, as a rule, have the same weakness or tendency to weakness, as well as the same conspicuously strong points. The elements of chance in breeding, the possible combination of ancestral influences, and the general tendency of nature to make types mediocre instead of superior, to strike averages by taking excellence from one place when the breeder has established high excellence in another, all conspire to make the proportion of specimens that have quality in every section, and no bad fault anywhere, generally small. Once in a while a breeder has a wonderful lot of good birds from a mating; but in the ordinary course of breeding that involves so many characters the number of faultless specimens is always limited. This fact is not discouraging to beginners but rather encouraging. The amateur who learns to produce good ones, and by careful line breeding gets an unusual proportion of them, will always be able to make more from poultry, for the capital and labor expended, than anyone else, and will also get more unalloyed pleasure out of his poultry work.

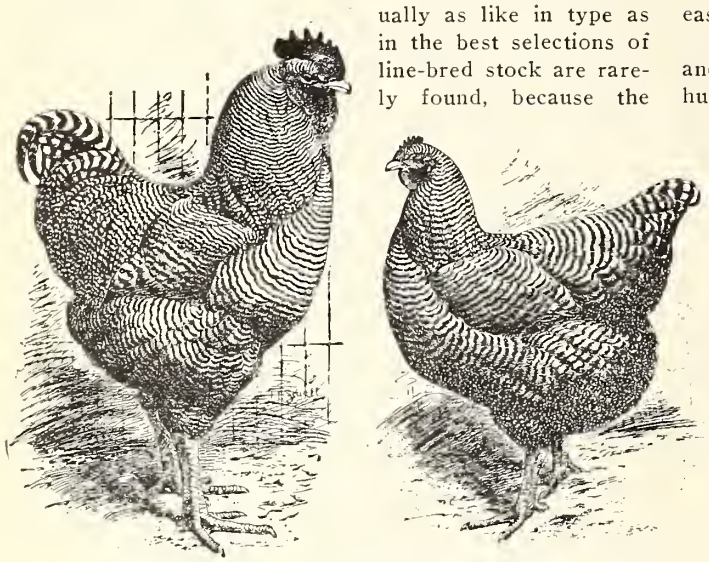
To return to the question of securing suitable birds to head a line: They are likely to appear at any time in well-bred stock, or in stock hatched from eggs from well-bred stock; but it is extremely doubtful that they ever come—as is sometimes stated—from ill-bred stock, or are of positively unknown ancestry. The few instances of that kind that have been reported were not well founded. In some cases where the facts came to light it appeared that the bird was denied the credit of its good breeding that the person into whose hands it had come and who profited so greatly by its merits might avoid giving credit to the actual breeder of the bird who had sold the eggs from which it hatched. Fairly good ordinary specimens sometimes come in stock of very indifferent breeding, but the writer has yet to learn of an authentic case of the production of a really fine bird of standard quality from inferior stock. As stated above, the real good ones are none too numerous even in the best bred stocks.

Experience Preparing for Line Breeding

Until one gets a bird—male or female—that is of exceptional merit, it may not be worth while to go to the trouble of making special matings and pedigreeing stock. This is one of the cases where practice with poor material does not teach enough to warrant such extra effort. While looking or waiting for such a bird the novice will learn most by simply breeding the best birds that he has as near to the standard as possible—that is, mate to produce standard chickens; mark the chicks from different matings, and study their characteristics carefully, in comparison with those of their parents, as they grow up. The wider observation that a beginner gets in this way is worth more to him at this stage than accurate study of smaller numbers of birds. And if he is using ordinary good breeding stock from a good strain the chances of the appearance of a bird good enough to head the line for a beginner in line breeding are much better in a mixed mating than in any single matings he might make. The reason for this is that the mixed mating will have the best male, and from four to eight, ten or more females, and in this grade of stock he really has as many matings with his best type male as there are females in the pen.

Single matings, or matings of a male with females as like as possible in type and of the same breeding, are the

best when we have high-class, uniform material to work with, but with only average good material to work with, the type somewhat variable, and the judgment of the breeder as yet undeveloped, he will probably get more by working his best male with an assortment of females as they will unusually run in the selection of a novice for his best pen. In stock of this grade, females that are actually as like in type as in the best selections of line-bred stock are rarely found, because the grade is made up of the slightly off-type females—meritorious birds valuable as breeders, occasionally producers of better stock than some of their sisters superior in type and quality, but not having themselves the type and quality that would put them in a professional breeder's best matings.



FIRST BARRED ROCK COCKEREL AND PULLET AT MADISON SQUARE GARDEN, 1895

The illustrations throughout this chapter show E. B. Thompson's "Imperial Ringlet" Barred Plymouth Rocks at periods a few years apart, from 1895 to 1920. All are Madison Square Garden winners.

The all-important thing for the novice in breeding at this stage is to study his stock, to study the birds individually and in detail, to take every opportunity open to him to examine the stock of others, and to become familiar with the breeding tendencies of the variety, and especially with the prevailing weakness and hidden defects. The merits of stock of even average good quality generally speak for themselves. Even expert breeders and judges are prone to overestimate average merit when they are not comparing it with superior quality directly or with the impression of the superior quality recently seen strong in their minds. But the faults, and particularly the little faults that are seen only when the birds are handled and carefully examined section by section, do not proclaim themselves and are easily overlooked.

The beginner in breeding also is prone to approve and accept the doctrine of those who declaim against hunting for defects in meritorious birds as something mean and unsportsmanlike, and quite beneath a true fancier. There is no occasion to enter here into a discussion of that subject as it relates to exhibitions, and enough has been said in this chapter of the potential values of defective birds to show the reader that they may have a place in a breeding pen; but if one is going to accomplish anything in breeding poultry he must know the faults in his birds very thoroughly, and he must be absolutely honest with himself in dealing with them.

Because of ancestral influences (back of the parents) in heredity, things sometimes crop out in the offspring which it was not possible for one who had not known the stock for some generations back to foresee. For this no one may be to blame; it is an ordinary risk of getting a start in breeding. But when a breeder fails to observe faults that could be easily found on close inspection, or when he—having noted such a fault—disregards it in mating, thinking that perhaps it will not be reproduced and that anyway it is a trifling thing and not to be allowed to count against the obvious merits of a bird, he is wholly to blame for the consequences. And the usual consequence is the appearance of the fault in a large proportion of the progeny of the bird that had it.

The breeder's one means of control of the natural laws of heredity is by selection of the individuals which he will allow to reproduce. When he puts faulty birds into his breeding pens and does not at the same time provide in their mates the qualities that may reasonably be expected to correct the faults, he relaxes control. He can not in any way govern the processes of reproduction, and the undesirable character has at least an equal chance of being reproduced, and usually more than that, for in selecting birds from the same stock the same small faults in all specimens are usually overlooked.

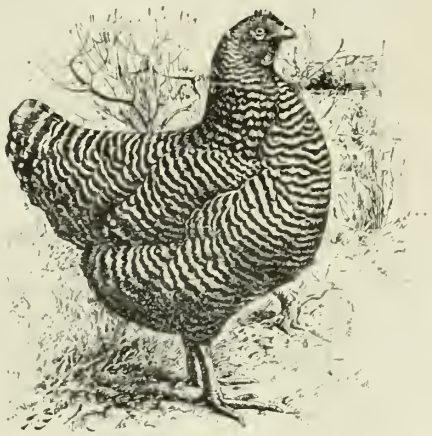
"LADY MARY", FIRST HEN 1900

FIRST COCKEREL 1897

"QUEEN OF THE EAST", FIRST PULLET 1900

Buying Birds for New Lines

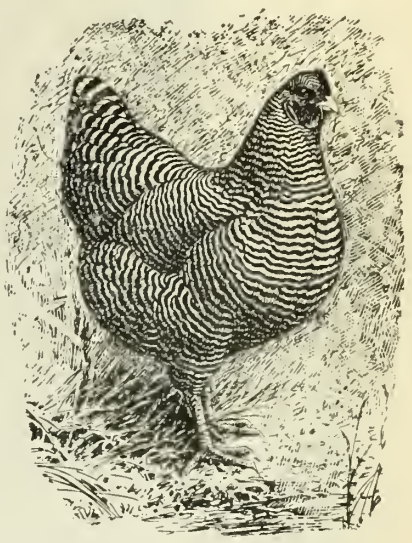
It is, of course, possible to buy breeding birds to head superior lines; but, as intimated, the number of those available is not great and the price is usually beyond the means of the average beginner—or, at any rate, is a higher price than it is really wise for a breeder to pay for stock until it is certain that he knows something about how to use stock to advantage. One cannot expect to get high-quality stock regularly and in large proportions from lower grades of breeding stock, though he may occasionally get a few remarkable specimens from those that have the breeding back of them; but unless stock is actually and badly degenerate, skill and judgment in breeding will always improve it. Hence, one can learn to breed with any stock that has normal capacity for improvement. If he can breed to improve ordinary stock—so that he can plainly see that it is getting better every year—he can take good stock and at least keep it up to the standard it had when he got it. But the breeder whose ordinary stock keeps going back year after year—the breeder who always has stock a little poorer than he started with—should not suppose that he will do any better with a better grade of stock; the only difference will be that it will take the better stock a little longer to retrograde so much that he will begin to be ashamed of it.



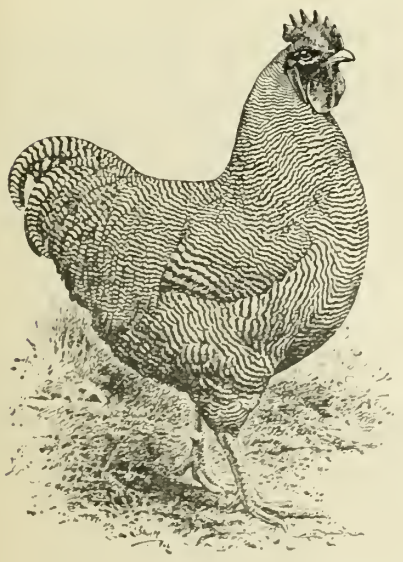
"BELLE OF NEW YORK", FIRST PULLET 1898

In general, the difference between low-priced and high-priced breeding stock is a matter of finish. The higher quality stock has correct type in more points than the inferior. Considered with reference to the breeder's capacity for observation, it is measurably correct to say that the grade of stock that he can breed is determined by the number of characters that he has learned to recognize readily, to value correctly, and to reproduce with a considerable degree of certainty. A beginner in breeding—one who really has it in him to make a good breeder and who is growing in experience and skill—often supposes that his birds are as good as those of a much better breeder, or that the difference between the stocks is slight. And it may be true that that is the case as to the points that he notes. But when he comes in competition with better stock, or when some one competent to do so compares his stock with better stock section by section, pointing out the differences, he sees that the more expert breeder has been giving careful attention to many details that he had not yet so much as learned to observe.

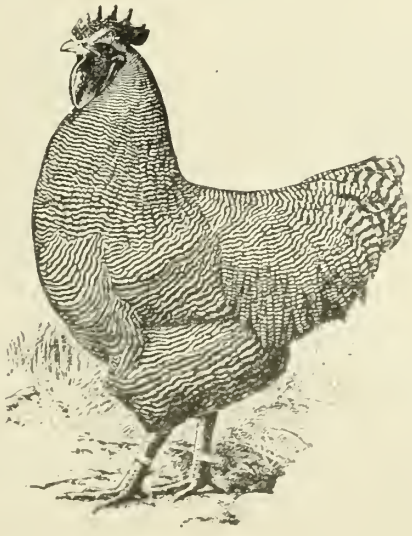
There is no advantage to a breeder in having material better than he really appreciates to work with, and it is the natural way, and a good thing for all concerned, for breeders to begin with ordinary good breeding stock, and to buy better stock as they see the need of it to improve what they are breeding. In this progress a novice in breeding may suppose again and again that some mating or some bird that looks pretty good to him is going to furnish the foundation of an extraordinary family; but it is not until he gets something that really is good, and that he sees is good, and knows why it is good, and just how good it is, that he actually enters upon a course of line breeding. All the other attempts are false starts,



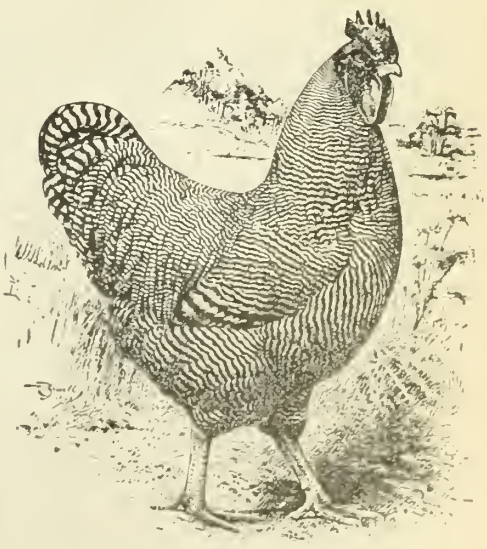
"RINGOLETTA", A PHENOMENAL PULLET GIVEN A MINOR PRIZE IN 1900



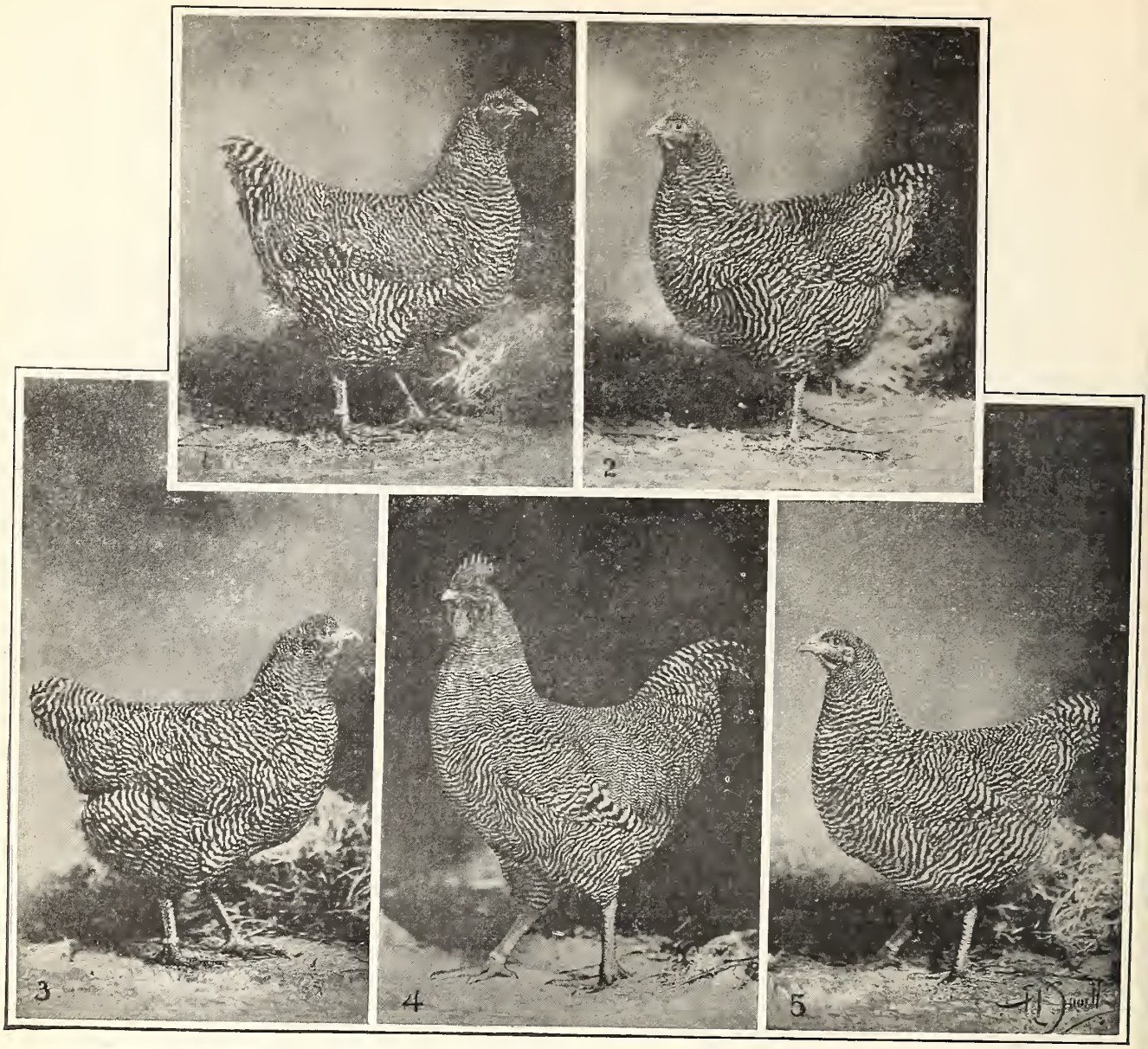
FIRST COCKEREL, 1906



FIRST COCK, 1907



FIRST COCKEREL AND CHAMPION MALE, 1907



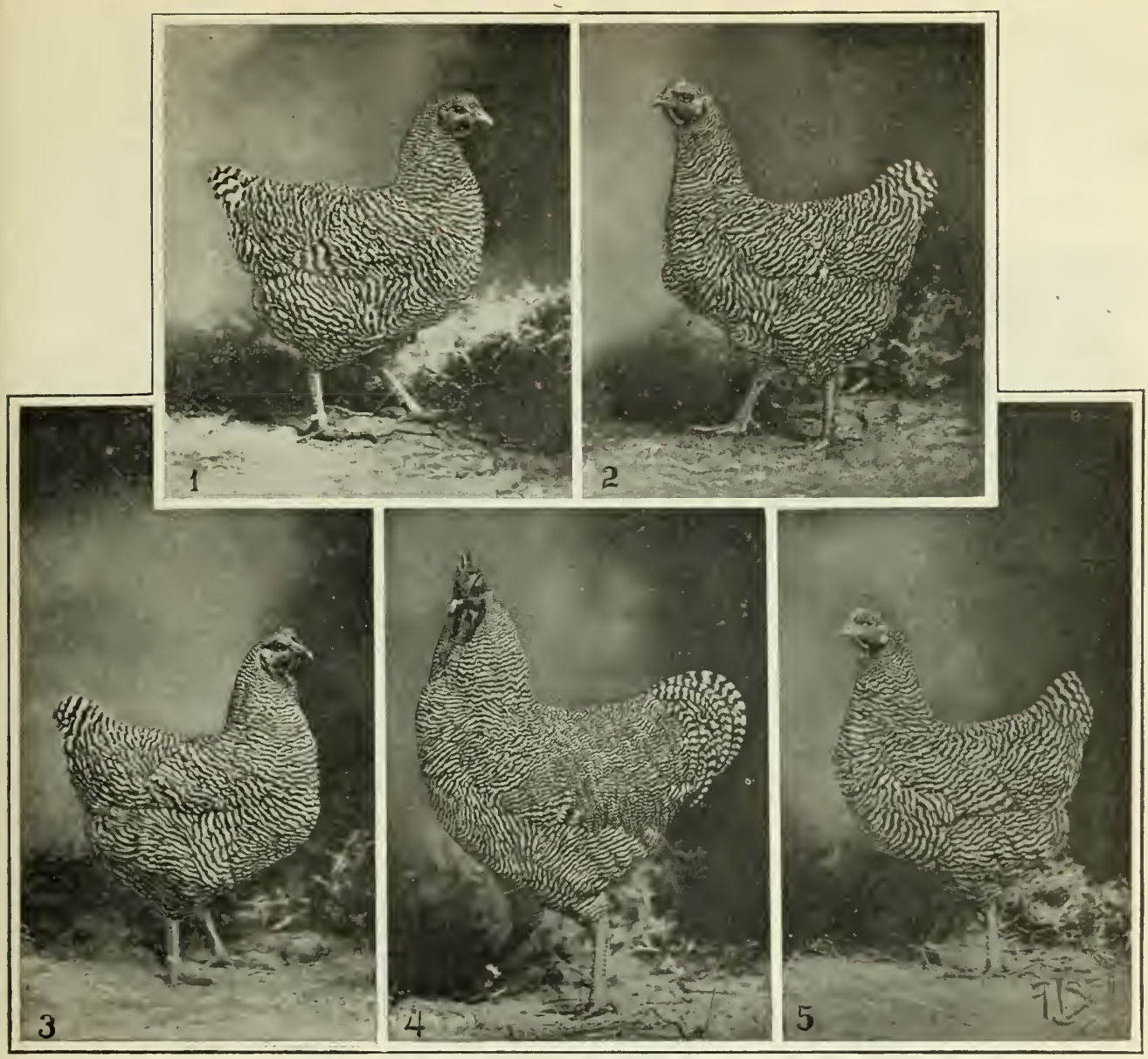
MALE AND FOUR FEMALES OF E. B. THOMPSON'S COCKEREL LINE IN 1913

and before the line projected is fairly started he will have found that there is something in it that he does not want, or some bird that he recognizes as superior will have turned up. In any case it takes several years to determine whether a projected line can be established, for there must be at least three generations producing the line characters quite regularly before the prepotent quality which is necessary in line breeding can be regarded as having been demonstrated.

Duration of Lines

The peculiar characteristic of a line being the direct transmission of high excellence (in an extraordinary proportion of offspring), it would seem that when lines of extraordinary value are established much of the difficulty of breeding would be permanently done away. The difficulties of the breeder are greatly reduced, for as long as a line manifests this exceptional quality it approximately exemplifies the maxim that "like produces like," and matings of birds in the line that are free from conspicuous faults (some such will always appear in any stock no matter how well bred) will give generally satisfactory results. But the law of variation, which is the law of change and the cause of improvement, is always operating, not only in the superior lines that become celebrated, but in other lines and in new combinations; and so, after a few generations, either a line breaks—that is, loses something of its quality or of its habit of direct transmission—or it is so far surpassed by lines of subsequent development that it is discarded.

The average life of celebrated lines of standard poultry, as commonly observed, is from five to eight generations. This may mean a much longer term of years, for valuable breeding birds are usually bred until three or four years old, and sometimes for six or eight years, and it is entirely within the bounds of possibility for an original or early mating in a line to be producing typically when the descendants of its first progeny no longer do so to the same extent. Occasionally a line is nominally continued through much more than eight generations, but in such cases—while the name is continued—there is almost invariably a modification of type, and the line has not its original type, though the changing type is being reproduced with remarkable uniformity.



MALE AND FOUR FEMALES OF E. B. THOMPSON'S PULLET LINE IN 1913

How Breed and Line Differ

A breed or variety is permanent. As long as there is any interest in it its type will be preserved in at least recognizable form. The written descriptions of the Standard are not in all cases exact specifications. On the contrary, many of them are rather vague, admitting of a variety of grades within the general limits of the descriptions. In actual application of standards the tendency is to limit the application as nearly as possible to only one recognizable grade at a time. That is, there are changes of style within standard specifications, but through all such changes the breed retains its identity. But it is the quality—the precise grade—of a line that distinguishes it, and the line is recognizable as a line, and is useful to the breeder, only as long as it is in some way superior to others. To paraphrase the familiar words of an old poem: Lines come and go, but the breed goes on forever. The development of the breed is through the constant succession of improved lines. The style—the particular type within the general type—of a breed at any time is set by the best breed lines in it that are exhibited at the leading shows.

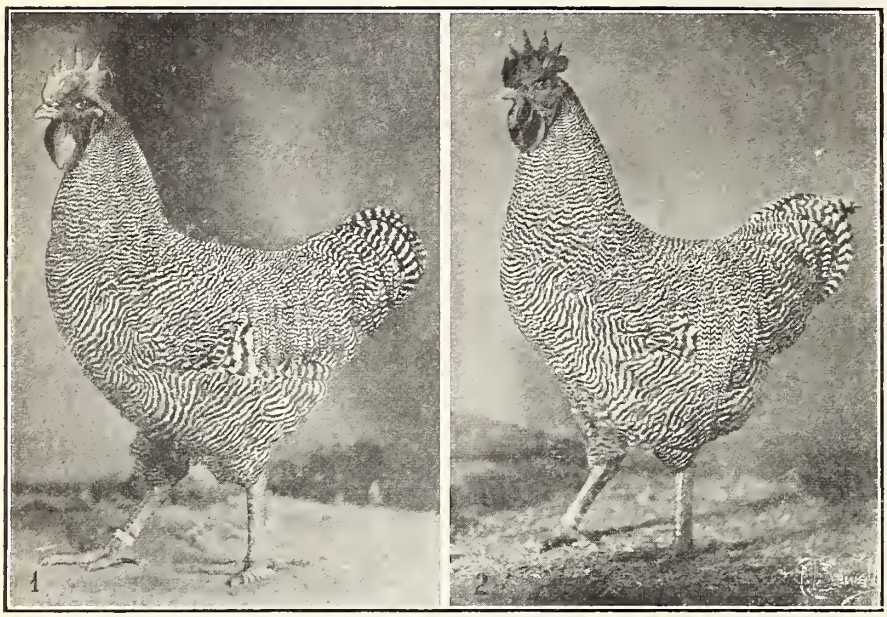
Line Breeding the Means, Not the End

Many persons seem to find it difficult to grasp the fact that line breeding is really a general method of breeding—in fact, the only method of fixing and maintaining certain types of character in approximate stability—and not a scheme or system cunningly devised to enable the breeder who understands it to formulate plans for a long series of generations ahead with assurance that he will get certain desired results and avoid certain other undesirable results, and particularly will get the advantages of inbreeding while avoiding its supposed serious dangers. Much of the discussion of breeding charts and pedigree systems of breeding tends to confirm this idea by attaching too much importance to particular sequences in the chart or system and to degrees of consanguinity in animals bred together.

To those who understand the real nature of breeding problems, pedigrees showing the lines of inheritance in stock, and especially in specimens of known character and quality, are always interesting and suggestive. They show the strength of breeding lines, and the peculiarities of some characters in transmission. But the expert breeder

does not make new lines according to any paper specifications. His lines are not made to fit certain preliminary specifications as to the method of breeding to be used in a number of successive generations, but are selected first for the superior quality of the individual that heads the line, and then for capacity to reproduce that superior quality.

Every mating that is made intelligently and judiciously to produce stock of a particular type for a particular purpose is a possible origin of a line of exceptional value in breeding for that purpose. The experienced breeder carefully watches the chicks from his numerous regular matings as they develop, and is quick to note in the growing chicks any superiority indicating unusual breeding value in their parents. His regular matings are made along and within lines whose general value has been demonstrated in his past experience. They are lines that he will rely upon until something better appears. That something better may come from any of them at any time, or it may come from some of the experimental matings that he makes—usually late in the season after he has finished hatches from his regular matings; or from such special matings of birds of rare excellence in most characters but with a bad fault in one, as were mentioned earlier in this chapter.



FIRST COCKEREL 1913, SIRE OF FIRST COCKEREL 1915

These experimental matings are not random matings, but carefully considered combinations of lines and individuals that seem to have possibilities of improvement or of the production of something that if introduced with care would add to the quality of the main lines. In all breeding we have to consider first holding what we have. Unless we can do that we can never make any substantial progress or secure stability in high breeding, no matter how brilliant may be the results occasionally obtained. Few experimental matings produce anything usable. Many experimental matings produce interesting results but along lines that would lead away from the Standard rather than improve according to the Standard. Sometimes a breeder follows such a line for a few generations, but as a rule he has no inducements to do so, for in odd types he can find neither competition for honors, nor sales that make profit.

No line of matings is ever followed by an experienced and skillful breeder when it is not plainly making progress in the direction that he wants to go. If a promising individual does not produce as he hoped that it would in one mating, he tries it in another. Most old breeders accept the theory that a good bird is always capable of producing something as good or better than itself, provided the breeder strikes the right combination in mating it. The average life of a bird as a breeder, however, does not extend beyond two seasons, and at most the breeder could not test it in more than two matings in a season and get any satisfactory idea of how it would produce. Usually he can make only one trial in a season, except where the first mating made gives such unpromising results in the young chickens that the bird being tested can be mated another way comparatively early in the season. To determine quality in the finer details in poultry the breeder must wait in most cases until the chicks are putting on their adult plumage, and in many cases the real quality as compared with the general stock cannot be determined until the chickens are quite well matured.

By trap nesting, or by stud mating (that is by keeping the hens in separate single pens and placing the male with them only long enough for service), a male can easily be tested in a great variety of combinations in a season, but in general an experienced breeder, mating according to his judgment, and not making all possible combinations in the expectation that somewhere among them he will strike the right one, keeps pretty close to the types his judgment tells him are the best to use together, and the variations in his matings are made more with reference to the breeding back of the birds he is considering than to the differences in them. That is, having decided that a certain style or type of female is the best to mate with a certain male, if he tries a hen of that style and does not get the results he wants, he looks for another hen like her in type but bred along somewhat different lines, and tries her in the hope that the combination will "nick" better than the first.

Line Breeding and Inbreeding

Going back now to the beginning of line breeding: A bird having been obtained—either male or female—of such quality that the owner desires to use it as the foundation of a line, the first step is to mate it with a bird of the opposite sex that is either of the same type and breeding, or, if somewhat different, has qualities that (if they can be added to the others without taking away what is distinctive) are desirable to incorporate in the line at the beginning. There are cases where good lines are made quickly from extreme combinations in the same variety, but these are in a sense accidental. Thus a breeder may chance to see somewhere a bird that strikes him at sight as having just the characteristic that, if it will combine right with something he has, will give a pleasing new style of a variety. These cases, however, are exceptional and in a way irregular. Mention of them

is appropriate here to show that all lines are not in the beginning made in the same way, but further consideration of the more complex cases is deferred until the simpler ones have been discussed fully.

The first step in what we may call simple line breeding from stock as usually handled is to mate with the appropriate bird of the opposite sex. Almost invariably this will be a closely related bird. It cannot always be found in the stock at once. Sometimes it has to be "made to order." Thus a female of remarkable type may appear, and while her breeding may be known, she has perhaps not a single full sister or brother, and not a half sister or half brother of anything like her quality. Her sire may not be a good mate for her if her type is that of her dam and there are some important different tendencies to be considered; or if her type is intermediate between that of her parents, the mating with the sire might give progeny that took after him more than was desired. In that case the most desirable mate for this female is a full brother, or a son that has her quality and type. If the owner has her sire and dam he may be able to get the male he wants from them. In many instances one or both of the parents have been disposed of before it is realized that the mating is needed for this purpose. Then the next best thing is to duplicate it as nearly as possible, both as to the type and the breeding of the male and female used. If the breeder has birds of near kin, on either side, to those that produced his exceptional female, he can make various matings with reasonable expectation of getting a cockerel that may mate well with this hen, and if he cannot get it in a full brother he is most likely to get it in a son of the hen herself, if he has a male at all suitable to mate with her for that purpose.

Common Errors About Inbreeding

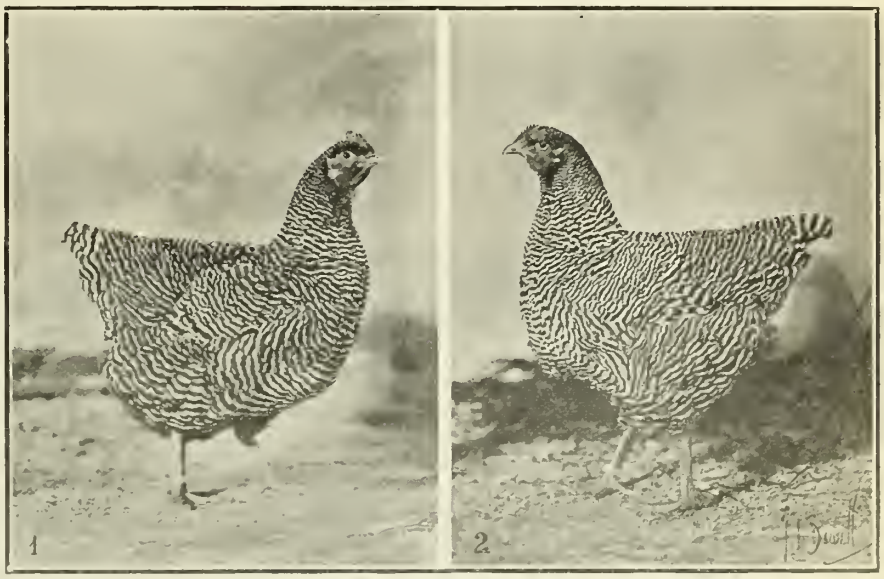
If the bird to be used as the head of a line is a male, the best mate for him will be found among his near female kin, and if there is none among them a mate must be made—just as in the other case. This means inbreeding, and may mean very close inbreeding. The novice in poultry keeping usually thinks that he knows that inbreeding is something that he must carefully avoid, or allow only to a very limited degree. This erroneous idea—that the breeding together of animals that are near akin is unnatural, and leads quickly to physical deterioration, barrenness and degeneration—is the great stumbling block in the way of beginners in poultry breeding. They have difficulty in overcoming it because there is in print so much of what was once regarded as authoritative scientific opinion that condemns inbreeding on the grounds stated; and traditionally and upon such old scientific authority a great many writers on poultry culture are continually warning against inbreeding as a fertile and serious cause of trouble in poultry stocks.

The scientific authority once invoked to support this view repudiated it long ago. The first position of the Darwinian school of scientists on this question was based upon unreliable and insufficient evidence. The later view of the same scientists, confirmed by the investigations of modern experimenters, and fully in accord with the general experience of practical breeders, is that inbreeding is not necessarily harmful, and that the evils which may be observed in connection with it are not peculiar consequences of inbreeding, but common consequences of breeding without proper selection for vitality and constitutional vigor—consequences which follow such indifferent selection whether the individuals are of near kin or of different breeds.

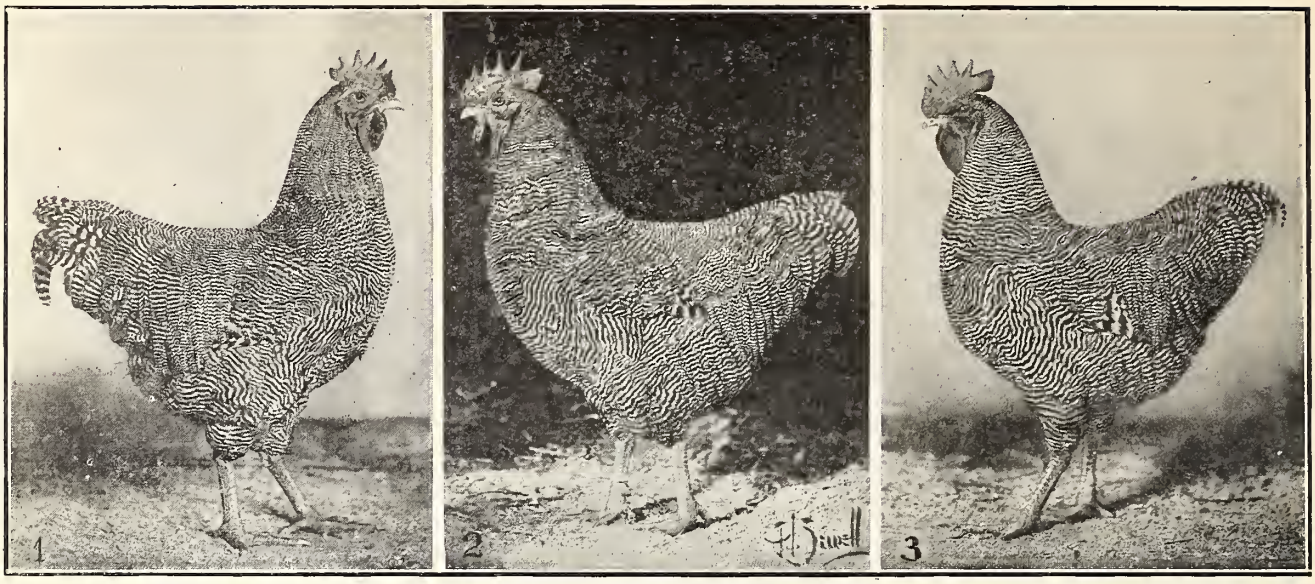
Line breeding requires the mating of males and females that are near akin. A line may originate from a mating of a male and female that are not closely related, but it cannot be established as a superior and prepotent line except through inbreeding. For if to avoid inbreeding we regularly or frequently bring in "new blood"—that is, the blood of families that are not near akin to the original line—we bring with this new blood so many variations and so many possibilities of destruction of the equilibrium of characters which has been established, that connected improvement becomes impossible.

Crude types may be maintained without inbreeding, but highly developed and finished types cannot be except by close inbreeding. It is not possible to produce the degree of uniformity in individual characters in the birds of the same generation and in their descendants indefinitely that gives a line, family or strain its character without continued close breeding.

When the facts are considered, and opinions and judgments based on facts, there is no room for an argument on this point. No one who tried to breed to type without close inbreeding ever got very far. Down to comparatively recent times—to within fifteen or twenty years—ignorance on this subject was so common even among those who should know better, and the prejudice against inbreeding was so deep-seated, that it was policy for poultry breeders to say as little as possible about the degree of inbreeding that produced strong breeding families. Buyers of little experience were much given to catechising breeders from whom they asked quotations on birds about the precise extent of inbreeding they practiced or thought safe, and were not only averse to buying from breeders who did not give positive assurances that they abhorred inbreeding and only resorted to it in



FIRST PULLET 1915, DAM OF FIRST PULLET 1916

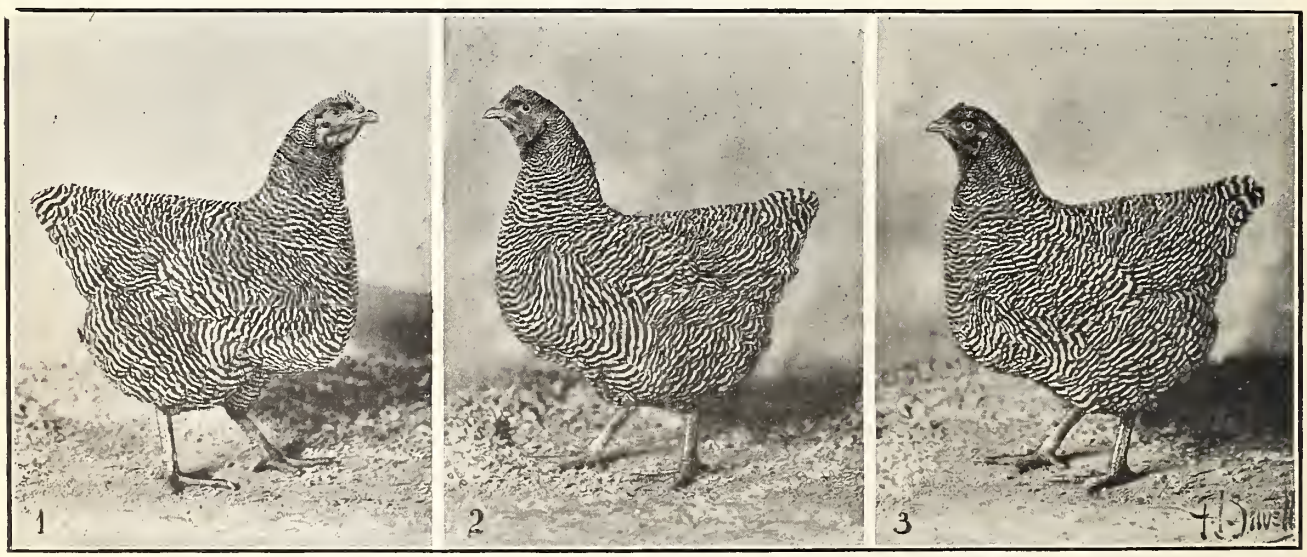


FIRST COCKEREL 1917 FIRST COCK 1916 AND 1917 FIRST COCKEREL 1916
Sire of 1st and 2nd cockerels in both 1916 and 1917.

emergencies, but were often diligent in warning their acquaintances not to buy of such breeders. The most common first specification in ordering birds mated for breeding was for birds not near akin, and it was a common practice for buyers of breeding stock to buy males and females (unseen) from different breeders and mate them together.

People who go into poultry keeping nowadays are on the whole better informed on the subject. There are not so many writers on breeding whose principal stock in trade is a prejudice against inbreeding. Prejudice is not as strong as it was; but there is still far too much of it to allow amateurs generally to go about the business of trying to breed poultry, as poultry breeders who can get results do, without considering kinship as a matter to be carefully manipulated to avoid unforeseen dangers. The breeder starting a line has to look into the matter of relationship somewhat carefully to avoid individual characteristics that he does not want in the near kin of the birds he breeds. But after a line is well established—when the birds in it are practically free from undesirable ancestral influences, and the faults that have been eliminated can only reappear as the result of carelessness in selection bringing them back by degrees—a breeder need not consider the matter of relationship at all in selecting birds for breeding, and he will usually get better results if he makes all his matings of the birds as he sees them, on thorough examination so that no possible weakness is overlooked.

After the matings are made in this way it is interesting, also should be informing, to note relationships; but there is never anything to be gained by mating birds simply because they are related. Related birds are mated because they are most like. In general, birds that closely resemble each other are nearly related. Occasionally birds of the same stock or strain but of different families will present striking resemblances, but birds that are near duplicates are almost always found to be very near kin—father and son, mother and daughter, brothers or sisters, etc. So, if a breeder carefully mates for type he cannot go outside of rather narrow lines, and the duration of any line really depends upon how long close mating can be pursued without the tendencies to faults in the line becoming so energetic that measures must be taken to



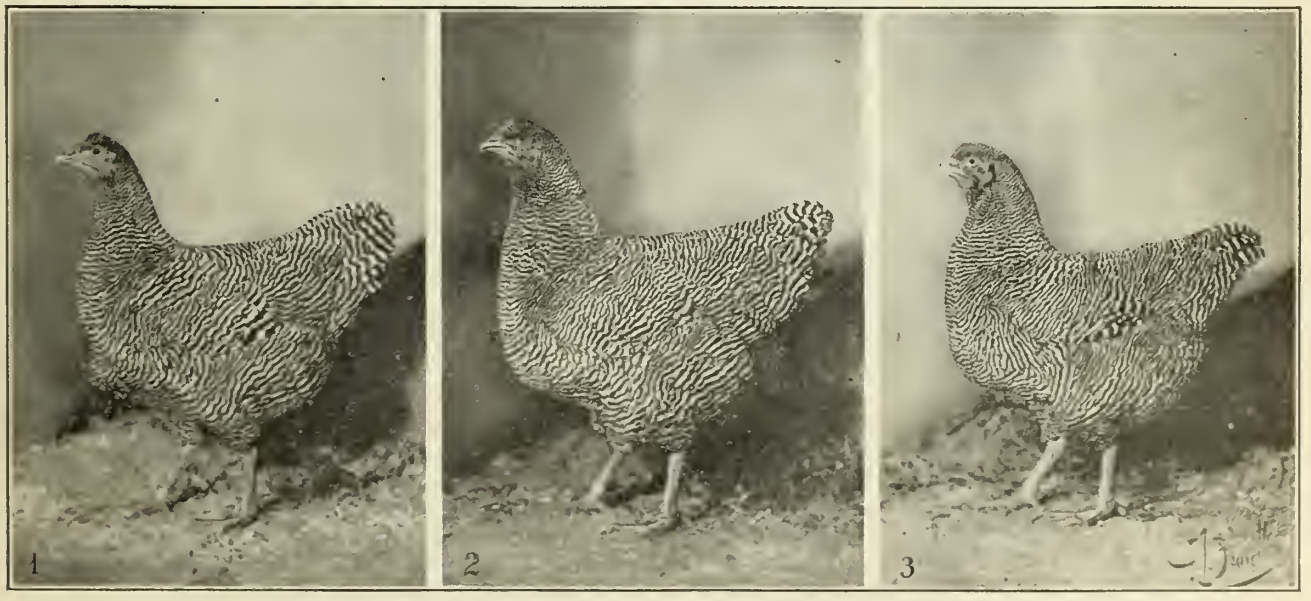
THREE OF THE PULLETS IN FIRST EXHIBITION PEN 1919

THIRD COCKEREL 1920 FIRST COCKEREL 1920 FOURTH COCKEREL 1920
1st and 4th cockerels are brothers.

counteract them; or — what amounts in the end to the same thing—without the strong points becoming so overdeveloped that they become faults.

Practical Status of Inbreeding

In effect, inbreeding consists in making animals in which reproduction from dual parentage has become the normal mode, produce as nearly as possible from a single parent. The single individual cannot reproduce itself, but by using for breeders animals that are nearest alike in constitution and appearance the result is nearly the same as if both sex elements were in the same individual. A line, while at the outset combining the blood of two individuals, usually soon becomes almost entirely of the blood of one of them. Thus a male bred to his daughter, and again to a daughter of this mating, and again to a daughter of the last mating, will give from the last mating progeny that are seven-eighths of his blood. A similar series of matings of a female to her sons will give descendants that are seven-eighths of her blood. That is as far as the series can often be carried with poultry because the birds are too short lived. Though some birds live and breed long enough to carry it one or two generations farther, it rarely happens that there would be any object in doing so, even if the old bird were still capable of producing offspring of as high vitality as when it was in its prime. One step farther in such a series would give progeny fifteen-sixteenths the blood of the head of the line; another step, progeny thirty-one-thirty-seconds of its blood. For all practical purposes a grade of seven-eighths in a line that has been properly selected for type is purebred; and in line breeding seven-eighths of the blood of the head of the line is practically a pure individual line. That last statement is a point of interest rather than a matter of any particular importance in breeding, for the question of proportions of "blood" and of de-



FIRST PULLET 1920 SECOND PULLET 1920 FIFTH PULLET 1920
These three pullets are sisters.

grees of relationship is always subordinate to the production of type.

While it is entirely probable that inbreeding, with proper selection for vigor, could be carried on indefinitely without any diminution of vigor, the necessity of considering other matters in selection for a high standard of excellence in many characters commonly operates as an automatic check upon inbreeding. Rigid selection for quality, maintaining the balance in each character close to the standard, and keeping abreast of whatever advances in type are taking place, make it necessary for the large breeder who has several strong lines and a considerable number of matings in each to blend his lines occasionally—making new lines; and for the small breeder who can make only a few matings in one line to go outside for what he needs for improvement.

The novice in breeding is accustomed to refer to this as going outside for "new blood," but that is not the real object, and the term is misleading. An expert breeder does not go outside of his own stock to get new blood. He goes to get a particular quality or character that some other breeder is getting a little better than he is, or to get something that will give him a particular development or blend of characters that is not so readily made in his own stock. The poultry keeper who knows how to breed is not in the least interested in any "new blood" except as it may be expected to give such results when combined with his own. He would much rather not have the new blood at all if he could get the characters wanted without it, for bringing in new blood has a tendency sometimes to bring out again in both lines old faults that had been suppressed.

The novice who buys new blood usually mixes it fully at once with that of his entire breeding stock. The expert breeder uses new blood only in special matings, and eventually mingles it with that of his general stock only if he finds that doing so will give the results desired. As a rule, it is much diluted before he does so, and it may be that out of all the offspring in several generations from the mixture only one or two birds are ever used for breeding. It is not uncommon for breeders to work for several years with small lines made up in part from outside stock, and then discard them.

Starting New Lines With Mates Radically Unlike

The mating of extremes in any character usually gives intermediate forms, and more or less variety in these forms. In a large number of progeny from such a mating there will often appear a complete series of intermediate grades and types. Some of these may be excellent and pleasing types, and many of them are likely to have one or more features of remarkable excellence, but none of these are well bred. They lack uniformity, and even of the best of them, those that approximate a standard type, no one can say until they are tested—perhaps in several combinations—whether they will reproduce with sufficient uniformity in any mating to make it worth while to breed from them.

Most breeders are inclined to avoid extreme matings because so little produced from them is usable or salable, and the birds that are satisfactory in appearance are of such doubtful value as breeders that they cannot afford either to experiment with them or to sell them to customers who will nine times in ten be disappointed in them. But occasionally the possibilities that a breeder sees in a union of extremes lead him to make such matings, and to work along with the best birds obtained from them—even though he only gets one or two a year that he can use—until in the end he gets a strong breeding line. Working on this plan is at the start more like making a new breed or variety than making an improved line of an old variety by ordinary selective breeding. The first mating of extremes is not at all likely to give an individual of the full type desired in a well-bred line. With good form or finish in some intermediate characters there usually will be other characters in an undesirable state, and one or two more matings of birds of different breeding, each bringing into the combination its special contribution, may be necessary. As an illustration of a case of this kind the writer will give an experience of his own in making a line of Light Brahmas some years ago.

In the spring of 1901, on a visit to I. K. Felch, in company with T. F. McGrew, I saw in a yard of discarded birds at the farm of Henry Felch, a two-year-old Light Brahma cock of massive form and great strength of color. His wing flights were solid black, the stripe in his hackle was very wide (and none too good) and his saddle was decidedly smutty. I had then a line of Brahmas that were of good size and remarkably good layers, but rather rangily built and lacking in strength of color. They were cleanly marked but with a tendency to narrow striping in hackle, and to too much white in tail coverts and wing flights. As soon as I saw the cock described, it struck me that mated with either one of two particular hens that I had he might produce something good to work with. I asked Mr. Felch what he would take for the bird. "If you want him, he's yours" was the reply. "I got him from Charlie Wheeler" (then a well-known breeder and judge of Light Brahmas, deceased a few years later). "I thought he might do me some good, but he never did and if anybody else can get anything out of him they're welcome to him."

That was in May. The bird came to my yards and was mated up with the two hens in June, but as they had been mated with another male, it was necessary to wait two weeks before setting eggs, and as the hens were not laying well at that season it was well on in July before I got enough eggs to set two hens. From these two settings of eggs about seventeen or eighteen chickens were hatched late in July. All of these were killed and eaten as soon as they were large enough, except one pullet. She had the shape and size I wanted but was not cleanly marked anywhere, and was very smutty in the back and with wing flights almost as black as her sire's. As a hen most of the smut disappeared, leaving her a fair-looking bird at a little distance, though her color would not stand close inspection.

In May of the next year, when this pullet was well grown, I mated her with a cockerel from J. W. Shaw that had all the color qualities this pullet lacked. The cockerel was taken sick and died within a few weeks, and the result of the mating was only a few chickens hatched late in June. The Shaw cockerel, while so fine in color, was not at all the type of body I wanted. He was one of the low-set type that accidentally came into style about 1900, and that was mainly responsible for the Light Brahma's loss of what popularly it then still enjoyed. So from this mating again, I got only one individual, a cockerel, that had the type of the dam with very good color. This cockerel mated to his dam gave a large proportion of both males and females with the size and shape desired, and a fair proportion of them good in color. The old hen mated to her best son from this mating produced still better and remarkably uniform offspring, as did the

mating I made of the last cockerel mentioned with his daughters, and matings of brothers and sisters of that generation. In fact, from this stage in the making of the line few birds not of the type would appear in any mating in it.

INBREEDING AND PRACTICAL QUALITIES

The history of the line of Light Brahmas described above is of further interest for its relation to the question of the effect of inbreeding upon "utility qualities." When the facts as to the extent of inbreeding by "fanciers" to develop the remarkable excellence and uniformity that are characteristic of well-bred exhibition stock began to be so well known that it was no longer possible to make people who could see things for themselves believe that inbreeding hurt exhibition stock, it was generally admitted that inbreeding was necessary to produce exhibition stock, but it was still maintained that inbreeding spoiled practical qualities. Many breeders of exhibition stock would admit this because their own stock did not lay particularly well, and they had more or less trouble in getting fertile eggs, and strong, vigorous chickens.

On the other hand, there have always been many cases of poultry keepers who keep poultry only for practical purposes, and who use what would be called low-grade standard stock, or even inferior stock, for producing market eggs and market poultry, who by selection within their flocks have improved size and egg production, and have had results coming better and better year after year, who—becoming uneasy for fear the imagined dangers of inbreeding would suddenly affect their stock—have killed off the males of their own breeding, bought "new blood" outside, and when the chicks came found that they were back where they started. It does not always happen that way. Frequently the new stock works well with the old, and results are as good or better than before. But in a large proportion of cases they are not, and it is always a mistake to introduce new blood into a stock that is doing well without first trying it out experimentally.

When the facts are properly analyzed, there is no reason at all for the conclusion that inbreeding affects different kinds of qualities differently—that it intensifies color and superficial shape points and weakens vitality and productivity. The necessity of exhibiting many of the same birds that are used for breeding is responsible for most of the experience with exhibition stock which is construed to show that the inbreeding that intensifies "fancy points" is detrimental to "utility points." Good laying and good fertility depend upon the birds leading a normal life, free from excitement and disturbance of every kind. While a few birds stand showing well, by far the greater number are so unfavorably affected by the handling, changes, excitement, and irregular living that birds placed upon exhibition have to go through, that it is a matter of weeks, and sometimes of months, after they are shown, to bring them into good laying and breeding condition.

All this is unavoidable for the majority of poultrymen who exhibit, and whose trade in stock and eggs depends upon their winnings. A few of the largest breeders have stock enough of different lines to be able to mate up some breeding pens early in the winter, and to keep a considerable proportion of their best birds at home and in good laying and breeding condition at all times. But the average breeder has to exhibit most of his best birds at least once in a season, and if he fails to make a good winning at one show may have to exhibit twice to get winnings of advertising value. As this has to be done year after year it operates constantly to reduce the vitality of exhibition stock, and—naturally—on the whole the best grade of stock is most affected. The lower grades of stock of the same breeding that are kept at home for layers, or are sold for breeding ordinary stock, often lay better and breed better than the best birds, simply for the reason given. Relieve the highest grade specimens of the hardship of being shown, and they will in most cases give a thoroughly good account of themselves in egg production and as sure breeders of vigorous stock.

Birds have to have an abundance of vigor to start with to make good exhibition specimens. Perfection can not be produced in either form or color in specimens that lack the vitality that is the basis of all utility values as well. But if the poultry breeder overdraws on that vitality when exhibiting his birds, he does not have it to use —with the same birds—in the production of eggs and chickens, until after he has by good care put them in prime condition again.

The particular case in the author's experience related above is not an exceptional case. He has repeatedly, both in this variety and others, practiced the closest inbreeding for from three to five successive generations without any loss of "practical qualities" and frequently has improved such qualities to a marked degree by inbreeding. Not only can it be done, but it is the only way that it can be done with any regularity in results. Practical qualities depend always, in the last analysis, upon vitality and vigor. While these are maintained, practical values are maintained, and realizing on them is a matter of good management. If exhibiting impairs the vitality of poultry, so does heavy production. We shall see when the question of breeding for egg production comes up that the exhibition of fowls is by no means the only thing that has tendencies unfavorable to the reproduction of practical qualities.

It is a general principle in breeding that to breed together individuals that are strong in any character intensifies that strength, and to breed together individuals that are weak in any character intensifies that weakness. It makes no difference what the character is, the principle applies—the law operates, until the further development of a character or exercise of a function becomes in some way detrimental.

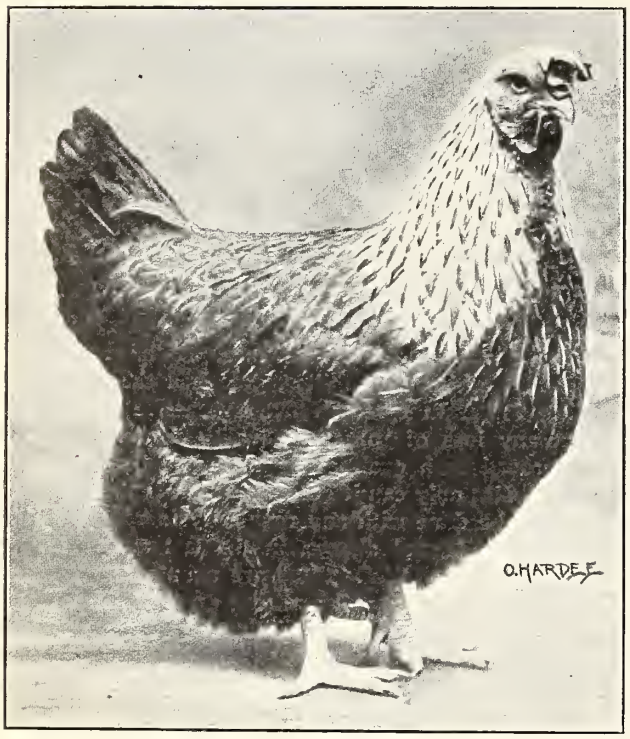
CHAPTER VII

Methods of Breeding Fowls For the Table

Good Table Type Described—Both Quantity and Quality to be Considered—Quality Not a Breed Character, But May Be Developed in Any Breed—Relation of Texture of Comb and Wattles, also of Bone, to Grain and Quality of Flesh—Possibility of Improvement of Quality as Well as Increase of Profit by Breeding for Quick Growth—Extent to Which It is Desirable to Modify Standard Types for Special Market Requirments.

Common Neglect of Table Values in Poultry

OF all branches of poultry culture the breeding of poultry for the table has been most neglected in America. Much poultry is grown for the table; comparatively little of it really bred for the table. All poultry, whatever other purpose it may serve first, is expected eventually to become table poultry. Everything



SILVER GRAY DORKING HEN

The finest model table type—distribution of flesh and proportion of edible meat only considered. The Dorking type is, however, not rugged enough to suit either farmers or market poultry growers in America.

that is not positively unfit for human food will be used for that purpose. In view of this it is plainly of the greatest importance that all poultry should be bred with due reference to its value for the table when the time comes to make that use of it. This does not imply that in breeding for table qualities in stock to be used for other purposes first there need be any lack of attention to those qualities, or that table qualities should in every case be improved to their limit. It is simply a matter of breeding for table qualities as far as that is compatible with other objects—which is much farther than most poultry breeders go.

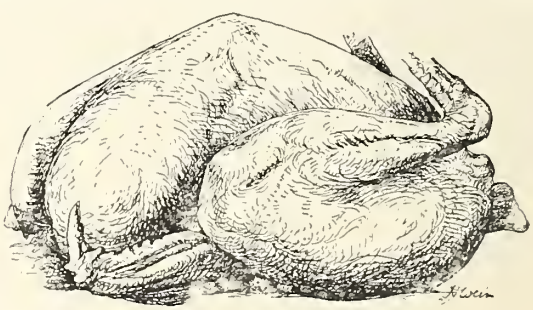
There was a time in the early history of the improvement of races of poultry when the scarcity of specimens of real excellence in color, comb and other superficial points justified the use of such specimens in the breeding pen, even though they might be decidedly inferior table fowls, or lack the qualities that make a good layer. It may be that still in some of the newer breeds and varieties there is occasion to do this. But in all well-established varieties the general characters are now so fixed, and the number of individuals of good general quality is so large, that there is no good excuse for breeding from a specimen conspicuously lacking in table points.

Standard Points and Table Properties

Further, breeding for standard shape in nearly all cases means breeding to a much better table form than is common in the carelessly bred stock of any variety, and also breeding to a type that is a better laying type than the average of stock of the variety. There are a few cases where a standard type in the style at present in favor among exhibitors is not as good table type as a modification of it to which the general wording of the standard specifications would still apply. And there are a few extreme types so far from anything which would be considered a desirable table form that it is hardly worth while to consider it in connection with them. But, in general, a fowl of good standard type for its breed is a good type of table form, and the stock of a breeder who holds closely to correct standard shape in his flock will run much better in table form than that of one who does not. As was stated in discussing breed types, many of these were made or fixed with special reference to the use of the breed for a particular class of table poultry.

The Ideal Meat Type

To get good working ideas of the development of the best table type within the general standard specifications for the breed he keeps, a poultry keeper should first be familiar with the characteristics of the ideal, or more properly, the model table type. This is developed in its perfection in the finest types of Silver Gray and Colored Dorkings. The White Dorking should also have it, but the writer has never seen but one lot of White Dorkings that did. According to his information these were not purebred, but were a cross of Whites and Silver Grays.



CARCASS OF A DORKING

It ought to have been possible to produce a good strain of Whites from this stock, but no more of it was seen.

The Dorking is both large bodied and fine boned. It is not as large as the Asiatics, and is even a little under

the standard weights for Plymouth Rocks and Orpingtons; but, because of its fineness of bone and the smaller amount of offal, it carries more edible meat than most

LIGHT BRAHMA ROASTING CHICKENS

Brahmas of good market type are well-meated on breast and body, but usually carry more meat on the legs than the best meated poultry of the smaller breeds. When the stock is properly grown this dark meat is soft and palatable.

fowls of other breeds of the same weight, or sometimes of even greater weight. It is also commonly cited as a point in favor of the Dorking that it has an extraordinary proportion of its meat on the breast and body, which furnish the "white meat," and correspondingly less on the legs, the meat of which is dark in color. This point is of more importance in fowls sold to market to a supercritical trade, for there is no question that as between any two poultry carcasses that are fairly well meated that which has the better developed breast will be the most attractive. Also when there is a notable deficiency in quantity of breast meat a carcass is not attractive. But where the carcass is well meated all over it is not usually a matter of much consequence whether there is a little more or a little less of white or of dark meat. On the whole (in America), a near-Dorking type comes nearer to meeting general requirements in a table fowl than the finest Dorking type.

The faults of the extreme model table type of fowl are a tendency to weakness in bone, inactivity, sluggishness and lack of ruggedness of constitution. Skilled and careful breeders can hold the type and avoid the development of these faults in a harmful measure, but where such tendencies exist in a type it will always be the case that common experience with it exaggerates its faults and fails to develop its merits. The standard Plymouth Rock type is—as stated in Chapter III—an Americanized Dorking type especially designed to give as much as possible of the excellence of the Dorking without the weaknesses which handicapped it. A reasonably long and deep-bodied Plymouth Rock, with medium-fine and strong bone, and balanced on its legs as in the ideal illustrations in the Standard, or as in the illustrations of model birds in this book, is perhaps as good a table type as can be made in a rugged and prolific fowl.

The Most Practical Meat Types

The Brahmas and Cochins have the same shape of body, in larger sizes, though the greater profusion of their plumage makes them appear more massive. The Wyandottes and the Rhode Island Reds must be regarded as modifications of the type to adapt it to special purposes. The Orpington is a fuller form than the Plymouth Rock, this fullness being both in the body and in the greater length of the plumage; while the Sussex tends more toward Dorking than toward Rock Shape. In the lighter weight breeds the best table form usually has rather fuller breast than the average good table-type Plymouth Rock, for these smaller breeds and those of laying rather than table type (not inclined to put on fat as they grow old), if they have the lines of a lean Plymouth Rock, look rather flat sided when dressed.

With form the first consideration in selecting fowls to breed table poultry, because form determines the amount and distribution of meat, quality of flesh is of equal importance; for while looks go a long way in selling poultry, it is quality that makes for increased consumption of poultry. The grower of table poultry needs to fix it firmly in his mind that his profit depends upon the sale of poultry to people who will gladly pay good prices for it because it is good. It is doubtful whether anyone in any part of America could make much of a living growing poultry for the table at prices that would make it as cheap eating as beef, pork and mutton. There are times when irregularities in distribution of the different kinds of meat, or unusual conditions of demand

"SOUTH SHORE" ROASTERS AS GROWN FOR THE BOSTON MARKET

The two side birds are crossbred White Plymouth Rock and Light Brahma. The middle bird is one of a pair of White Plymouth Rocks which weighed 22¼ pounds at seven months of age.

for some of them, make poultry cheap eating; but normally only the most inferior grades of poultry appear to be as cheap as the other meats and this appearance is often deceptive.

On the farm where it is grown at little cost and obtained at first cost and without shrinkage in weight and value, poultry is cheap enough for free consumption. In the cities remote from sections that produce a surplus of poultry it is not—even at the regular market prices which would not give a near-by poultry grower an attractive profit. The people who buy poultry frequently are mostly those who like good eating and do not have to econo-

BLACK GIANT COCK AND HEN

The "Jersey Black Giant" is growing very rapidly in favor as a table fowl.

mize carefully in food. The extent of their buying depends largely upon the quality of what they get—the better it is the oftener they buy it, and the more willing they are to pay a good premium for it. So the matter of quality is one that the poultry grower ought to give his best attention.

Relation of Breed Characters to Quality of Flesh

Quality of flesh is not a breed characteristic in the sense that it is fixed and cannot be changed, or even in the sense that a particular quality pertains to a particular breed. Unless it is the Dorking and the Sussex, both of which are in quite limited numbers here, and the Polish, and possibly the Faverolles—also in very limited numbers, there is no breed of which it can be said that it is generally of superior table quality. But in nearly all breeds there are individuals, and sometimes families, that are of very fine table quality; and here and there may be found stocks of fowls that are predominantly of good quality. The reasons for prevailing good quality in the breeds mentioned by name are: English breeds and especially the old English breeds have been bred with more attention to quality of meat than any of the American breeds. The Dorking and the Sussex fowls were bred for centuries as the common fowls of a district where particular attention was given to the production of poultry for the London market. In the Polish the exaggerated development of the crest interferes with the sight of the birds, and consequently with their activity, and as they are generally bred for both plump, full form and fine bone, fine quality of flesh which almost invariably goes with fine bone is the result; and although the Polish have other characteristics which rule them out of consideration when breeds are chosen to produce table poultry, their flesh is uniformly tender and juicy.

The Faverolles are a French breed developed under conditions similar to those in which the English breeds mentioned were produced. The Houdan is in the same class, but Houdans in this country have been of several types and often not at all remarkable for quality, though by reputation they are ranked with other French breeds as very superior. The Orpingtons as first brought to this country in small numbers were of good type and generally much better table quality than average stock of American and Asiatic breeds here, but when the boom in them began, and they were brought here in large numbers, they showed the same variations of type and quality as are common in other breeds. It is commonly and usually very positively asserted by admirers of the breeds that have been named above that their flesh is of a fineness, juiciness and quality not found in other breeds. And a considerable number of writers and lecturers on poultry taking their cue from these claims and from foreign utterances on the same line have circulated such ideas until there is a widespread impression in this country—even among poultrymen who should know better, if they would take the judgment of their own senses—that poultry of other breeds could not possibly have the quality of the European table breeds.

The truth as to that is that there are some birds of just as fine quality in many other breeds and probably in nearly all of them. It would be rash for anyone who valued his reputation for judgment and discrimination in such matters to say of any breed or type of fowl that a bird with flesh of the finest possible quality could not be produced in it. In all breeds for which the Standard specifies that comb and wattles shall be "fine in texture," or "smooth in texture," or merely "smooth" it will be found that the specimens that conform best to these requirements are usually fine grained in flesh. Such birds are often as fine in table quality as it is possible for fowls to be; and this fineness is not, in the writer's observation, a thing that varies with the size of the birds—that is, small birds finer than large ones. There are Cochins and Brahmas of the largest sizes that are as fine grained and as delicate in flesh as any birds in breeds that have much better reputations for that quality. There are also extremely coarse birds in these breeds—coarser than in any others with the possible exception of the Cornish.

Texture of Skin As a Mark of Table Quality

In most breeds of fowls the Standard calls for fine or smooth texture of skin. It cannot be affirmed that this requirement was made in view of its correlation with table quality. The attractiveness of the smooth, fine comb and wattles was probably more in the minds of Standard makers, who would hardly be expected to consider in their relation to table quality details to which breeders of table poultry were giving little attention. However that may be, what the Standard requires for beauty in the comb—which is discarded as offal—is a point so closely associated with table quality that we are warranted in using it as a visible indication of quality. The correspondence of fine skin on the exposed parts of the head and head appendages with fine skin all over the body is undoubtedly regular, and the correspondence of fine skin with fine-grained flesh appears to be common and general, though observation upon this point is more difficult because it is so easy when examining the flesh of a dressed fowl by the touch, or judging its texture when

eating it, to confound coarseness and hardness, or softness and fineness.

From what we can see in other characters of the possibility of a character varying in different sections, it does not appear impossible for a fowl to have fine skin and coarse-fibered flesh, and it frequently happens that

PAIR OF "BLACK GIANT" CAPONS

a fine-skinned bird is tough meated and sinewy and appears—or is considered—coarse. But on the whole it is safe to assume, when considering the breeding value of a bird as a producer of table poultry, that the finer skin is an indication of correspondingly fine-grained muscles.

Character of Shank and Table Quality

There is also a general correspondence between the bones and the muscles, and a fine-skinned, fine-fleshed bird is usually a fine-boned bird. But in judging for fineness of bone we must consider whether the bone is normally developed and symmetrical and strong, or is the abnormally fine and frail bone often seen in unthrifty birds.

The shank of a fowl is an absolutely reliable index of the character of the bones throughout. A common specification in Standard descriptions is that the shanks must be straight. This means straightness in the same sense that the legs of a man, or of a horse, or of any other animal, are called straight. It is the leg as a whole, the leg itself as a support to the body, that must be straight. The specification does not mean that the outlines of the shank must be perfectly straight. Yet a great many breeders so construe it. If they do not actually select or prefer a bird having a shank with straight outlines, they regard a shank of that description as passable, or as not undesirable, and as a result of this far too large a proportion of well-bred fowls are weak in this particular.

A strong and symmetrical shank in any breed is heavier at the joints than in the middle. A part of the outline midway between the hock joint and the foot may be perfectly straight, especially in front, but to be symmetrical the lines of the shank, from whatever point they are seen, must curve slightly, gradually and nicely from the straight line of the middle toward either end, and in the best combination of strength and fineness of bone there does not appear to be an absolutely straight line anywhere, nor a pronounced curve anywhere in the length of the shank. Anyone who will observe and compare the shanks of fowls of any variety can hardly fail to note that the best looking shank among the many variations that are seen is the type I have described. Whoever selects and breeds for this point will not only get fine-grained flesh in his poultry, but higher merit in many other desirable qualities.

The two kinds of shank that are to be especially avoided in breeding poultry for the table are the slender, straight shank that looks like a stick—that has more of the appearance of having been cut out of wood and painted than having grown in bone—and the very coarse shank that tends to be deeply ridged toward the hock and has a flat, thick, swollen appearance just above the foot. The first form described is most characteristic of poorly grown birds and of birds weak in vitality that could not grow well and symmetrically even under the best of conditions. In the first case the individual is undesirable, and in the second the stock is unsuitable for breeding table poultry.

The coarse shank described is the result usually of going too far in breeding for an appearance of substance and massiveness in large fowls. It is seen in its most pronounced form in specimens of Cornish in which the Cornish type is exaggerated; but it is also common in Brahmas and Cochins in which it is not so prominent in the living bird because the heavy feathering of the feet conceals it. This structure of shank is characteristic of size without strength—a certain sluggish capacity for growth without marked vigor and vitality—and extreme coarseness in every respect. It is quite prevalent not only in the breeds named, but in stock that is bred for large size, or blocky, chunky type. Many breeders do not appreciate the difference between firm, strong, and relatively small bone and heavy bone, and when the Standard specifies that shanks shall be "stout" it suggests to their minds bulk rather than strength. With a proper appreciation of the characteristics that make the nicest type of

THE SAME PAIR OF CAPONS DRESSED
Weight of the pair, 26 pounds

shank in a fowl, a breeder can tell very accurately from the appearance of the shank the relative coarseness or fineness of the flesh of a fowl.

These two points, the texture of the skin as seen in the comb and wattles, and the character of bone as seen in the shank, together indicate both the character of the flesh and the general condition of the fowl. With ordinary discriminative power in considering them it is hardly possible for a poultry keeper to use them erroneously.

Effect of Rate of Growth on Quality

The next point to consider is rapidity of growth. It is a common complaint against large breeds, and the large strains of medium-sized breeds, that they grow too slowly and take too long to mature. This complaint usually refers particularly to the length of time that the pullets must be carried before beginning to lay, but is also frequently made in regard to the cockerels which in slow-growing large breeds are generally too leggy and scrawny through a long period of their growth to make good and attractive poultry. This means that the grower of such stock cannot sell it to advantage at any stage between broiler size and maturity. These complaints are too well founded. As to most large stock they are warranted. But the fault is not the fault of the breeds, but of breeders who do not select for good type, fine flesh and quick growth.

What might be done in the way of making strains or breeds of fowls capable of much quicker growth than any we now have no one knows, for it has never been systematically tried; but breeders who have observed have seen in their experience numerous cases of remarkably rapid growth in birds which at maturity are about average size and weight for their kind. Large birds are usually (not always) larger when hatched and also throughout the period of growth, than their mates that at maturity are smaller than they, but they also, as a rule, keep on growing longer, and a large part of their greater size is made after the other birds of the same kind and age have stopped growing. For some purposes this is an advantage. It has been so in the growing of winter chickens for large roasters, and will probably always be so in the growing of spring chickens for large roasters on farms where they can pick a considerable part of their living during the spring, summer and fall, and can then be finished on cheap grain produced on the farm.

But the special "soft-roaster" industry is now so limited, and so many uncertainties surround it, that market poultry growers are more and more inclined to devote themselves to something that brings quicker returns; and while much might be done on general farms in the way of producing large roasters, it will not usually be to the advantage of farmers to engage in that line unless they are especially favorably situated for it. All the trade that wants very large roasters and will pay the premium for them that makes an inducement to grow them, can be supplied by a relatively small number of poultry growers. The bulk of the demand can be supplied with such roosters as can be produced from the medium-sized breeds, and in these there is an undoubted advantage in having stock that will grow to standard size and weight as quickly as possible. Moreover, in regard to the large breeds, in which the long period of growth may sometimes seem an advantage, it is questionable whether it is to the interest of the breeds or of growers to encourage that tendency.

Even the largest breeds can be grown quickly. That they are not generally of quicker growth is due in part to the absence of conditions most favorable to the production of big birds, but even more to the common idea that they will take so long to grow anyway, and it is not worth while to try to change that habit. This is one of the errors of breeders of the large breeds that limits their popularity. Our largest breeds can be grown to full standard size and weight for mature birds (not for young birds) in about seven months for females and a little over a month longer for males, and the weights they then have will be their weights when in good breeding condition through life. In the medium and smaller breeds full standard weights for adult birds can be obtained in chickens at ages nearly as much earlier in proportion than those just specified as the weights are less. It cannot be done off-hand from any material available, but it can be done by persistent selection of the specimens that make full growth quickest; and it is altogether probable that by proper use of the occasional specimens that make phenomenally quick growth strains could be produced that would grow to full size as quickly as these phenomenal specimens do.

Market Poultry Growers' View of Inbreeding

Nearly all market poultry growers have a strong (one might say even a violent) prejudice against inbreeding. It is not what might be called an expert prejudice—founded on experience—but is simply a manifestation of the popular prejudice. Market poultry growers generally, and nearly all poultry growers who are not themselves able to breed to a uniform good type, will affirm with great positiveness that "inbreeding" quickly makes stock of no value for their purpose. Without inbreeding, and very close inbreeding, the character of phenomenally quick growth could not be developed in a stock from a single specimen or a few specimens showing that characteristic. Recalling what has been said in earlier chapters of the uncertainties of transmission of characters in the earliest stages of line breeding and strain making, the reader will understand that not every effort of this kind would succeed. The point the writer wishes to impress here is that so far there has been no systematic effort made to show what could be done in this direction, and that until the possibilities have been thoroughly tried out we do not know what can be done nor how far it would be wise to push development of this characteristic

Minor Details of Selection of Table Poultry Breeders

It being understood that a breeder of table fowls will select for good form as apparent to the eye, for fine quality of flesh as indicated by the texture of comb and wattles and the structure of the shanks, and for quick growth as noted by observation, the breeder of table poultry who wishes to insure that when he has attended to these points the results will not be disappointing must take particular note of the individual defects in the birds that he proposes to use, and also of the possible tendencies toward the exaggeration of points of interest and value to him. These are matters which the breeder of poultry for the table is apt to overlook or to pass over as of no particular consequence. He usually considers birds just as he sees them and makes no allowance for over and underdevelopments as a result of the combination he is making. The refinements of breeding he considers outside of his province. It is all well enough for a "fancier" to spend hours carefully examining his birds when mating them, but the "practical" poultryman is not concerned about insignificant details in which buyers of table poultry take no interest.

It is right here that the grower of table poultry who takes this attitude makes one of his greatest mistakes. It is true that the consumer of table poultry does not criticize it in detail as the buyer of exhibition poultry does. He neither professes to be nor desires to be an expert judge of the things that contribute to the appearance or the quality of poultry or to his pleasure in using it. He leaves that to the breeders, growers and dealers. The dealers, as a rule, do not come in direct contact with producers. In fact, table poultry usually passes through so many hands, and the consumer is so far removed from the producer, that neither gets the education upon the things relating to table poultry that he would if there was direct contact between them. This makes it all the more important for the breeder who aims to produce the choicest of table poultry to study every feature of type

Common Deformities in Table Poultry

There are two serious faults in table poultry—faults in shape—that are not readily apparent to the eye, and sometimes not visible to the eye at all, because of the extent to which the plumage conceals them. They are crooked breast and crooked back. Either can be instantly detected by touch when the bird is handled. In discussing exhibition poultry, crooked breast refers really to crooked keel. The keel is in the body section, as much as in the breast section, as these parts are designated in the Standard descriptions. When a fowl is dressed and the carcass laid on its back with the legs drawn back, as is usual when poultry is displayed for sale, the breast appears to be (and in fact is) all the large wing muscles extending from the shoulders almost to the vent along the keel. But as the bird stands in life, or as the living bird is handled, what appears to be the breast is the part forward from the point of the keel bone, which is a thin ridge running lengthwise of the thin, flat "breast" bone. Crooked breast, as the term is commonly used, is a malformation of the keel—either a turning over to one side, or curvature so that the ridge is not straight. Often there are several curvatures so that the line of the edge of the keel bone is a waving line. All these faults are most conspicuous in thin birds and those deficient in flesh on the breast and body, but wherever they exist they detract from the appearance of the carcass, and that means that it will not sell so readily or command as good a premium. Marketmen who are expert in "shaping" poultry carcasses to conceal such faults can make one that has not too bad a breast look well enough to suit a customer who is not too critical, but this is a service the marketman does for himself. He takes advantage of every fault to force down the price of poultry he buys, and if he can improve its appearance by any legitimate means he sells it to better advantage. .

Nor is the crooked breast simply a more or less unsightly malformation. It may be an indication of weakness in the bone of the fowl, prevalent in the stock, which the poultry breeder should take steps to remedy. It is quite commonly supposed that crooked breasts are caused by chickens perching too young, and on too narrow perches. No doubt these causes are responsible for many cases that, had they been avoided, would not have appeared. But many chickens roost young on narrow perches without developing crooked breast; and many that are not allowed to roost until full grown have badly twisted keels. Deficiency of lime in the ration when the chickens are growing may cause crookedness in breasts that with a good supply of lime would have been harder in the earlier stages of the life of the bird and would have grown straight. It is difficult, however, for a breeder to distinguish certainly between cases as due to different causes, and the practical way to breed both the fault and the tendency to it out of the flock is to be very cautious in the use as breeders of birds that have not perfectly straight keels. A little latitude may be allowed in a female, but none at all in a male, and even in females the slight latitude should be allowed only when one begins to use careful selection to eliminate this fault. Every year he should be more severe in discarding it, and after three or four years should bar it altogether. Having bred the fault out of his flock a breeder should be most careful not to bring it in again with "new blood."

There is another form of crooked breast in table poultry that is only a little less unsightly in its extreme forms than the twisted keel. This is the breast that has much more meat on one side than on the other. Slight differences in the development of the two sides of a body are very common—almost the rule in all creatures. A person slicing meat from the breast of a fowl, turkey, duck or goose, frequently finds a little less meat on one side than on the other and supposes that the difference may be accounted for by the slices having been cut thicker on one side. But when the development is very unequal there is no room for doubt either when the flesh is in normal position or when the bird is carved, though a salesman may by pressing the meat on the defective side forward as much as possible make the difference in meatiness of the two sides less conspicuous.

To avoid these defective breasts a breeder should, when examining a bird for twisted keel, let the weight of the bird rest on the palm of his hand, and while feeling the keel with the middle and next fingers, note by touch of the thumb on one side and the little finger on the other whether the sides are filled up well and evenly. The greater the breadth of breast and body—the more completely the hand seems filled—the better. In a good type of Cornish, a bird resting on the hand this way will keep the thumb and fingers straight, or nearly so. Yet breadth of breast does not always mean the greatest quantity of meat on breast and body. Some large birds that are quite V-shaped in body will have a surprisingly large quantity of meat when they are served. Such birds do not show what they have until cut up, and the type is not a good one to propagate.

Crooked backs are also of two kinds—those that are positively deformed, usually having one hip higher than the other, and those that are naturally a bad shape. Deformity of the hips is principally, if not entirely, due to crowding chickens while growing. Some of it is probably unavoidable in chickens grown for the table on a commercial scale, but stock grown for breeding ought to be free from it; and on no account should a bird be used to breed from that, when the hand is moved over the back so as to touch the hip bones, is found to have one hip higher than the other.

The shape of back to be avoided in breeding table fowl is a roach-back—that is, one that arches up in the middle instead of being flat across the shoulders and nearly straight from neck to tail. A bird with a pronounced roach-back is not usually very symmetrical in other sections, and in selecting for general table form would be likely to be discarded. But there are many birds with slightly roached backs that would not be noticed unless the bird was examined particularly on this point. These are objectionable because a bird of this shape will not lie right on the platter when served whole at the table. The only way to detect this fault in the living bird when

present in moderate degree is by passing the hand over the back, pressing down the plumage so that the form of the back is apparent to the touch.

Overdevelopment in Table Type

In breeding to secure the finest development of table qualities there is always a tendency to carry a good quality to the point where it becomes in some way a weakness. If we persistently breed to secure the largest possible amount of flesh on a fowl, and the least bone, eventually we will have fowls that have not bone enough to carry their weight. If selection is continuously made for birds that fatten easily and also for quick growth, a type is made that is hard to keep in condition to breed satisfactorily. Quick growth in table poultry means early egg production in the pullets. Then if the pullets are allowed to lay when they come to maturity they will not be at their best as breeders when the breeding season comes; while if they are prevented from laying—having a natural tendency to fatten—they put on fat, and that puts them out of condition both for breeding and for laying purposes. In this way the best table type tends to run out more quickly than one of more moderate development. Regardless of breed, the finer stock is in all the points that go to make good table poultry, the more difficult it is to keep it in condition to produce eggs in abundance, strong fertility and vigorous chickens

For general use the Plymouth Rock type is a much better type than the Dorking or any other highly finished table type, because the inexpert breeder has more margin of safety between it and overrefinement of it. This applies to the correct standard Plymouth Rock type, not to the several irregular types that are so common in it—as the excessively wide-bodied, low-set type, the extreme rangy type, and the slightly undersized, compact type. The first, while lacking well-balanced table form (being much meatier in the legs than on the breast and body), has all the undesirable tendencies as a result of overdevelopment of flesh on the legs that it would have with overdevelopment of flesh all over the body. The rangy type is slow to mature and inclined to coarseness The compact type tends toward the egg type.

Breeders of table poultry who breed for a very meaty carcass often find that the first generation or two of heavy birds are kept in laying and breeding condition quite as easily as the stock was before this full development of flesh was reached. Noting this they are likely to conclude that their stock or strain is free from the common tendency of meaty fowls to become more sluggish than others. Two, or at most three years, will show them that they are mistaken. To avoid the development of meatiness to the point where it becomes a handicap, a breeder of table poultry should always have at least one line of his stock that is a little more spare in form than the lines that produce most of his breeders, yet is equal to them in weight—birds that have a little more length in body, legs and neck, and are more energetic than the others. Some such birds may be produced in the regular matings for full-formed stock, but if the lines are well bred for table form there will never be many of them, and such as are obtained will have less influence to modify the tendency of their line than would birds from a slightly different side line. If a breeder does not do this he has to go outside of his flock for breeders to check overdevelopment, and when he does this he may find his stock put back several years. The question of the use of slightly off-type individuals and lines to preserve the desired type in a flock will be considered more fully in the chapter on breeding to standard. The principle is the same, whatever the breeder's object.

Color of Skin and Quality of Flesh

European table breeds have "white" skin with usually flesh-colored or slate-colored legs. The Dorkings have the former color, and the French and Continental breeds generally the latter. European authorities generally express much prejudice against poultry with yellow skin, and especially against yellow fat. They very positively assert that poultry with yellow skin is quite inferior to white-skinned poultry, and that yellow fat has a strong taste not in white fat. The origin of these ideas evidently lies in comparisons of European table breeds with Asiatic fowls when the latter were first introduced. That much of it was very coarse all accounts agree. As none of the yellow-skinned breeds have been bred for table quality as carefully as the best European types, it is plain that on any casual comparison the chances would be that a white-skinned bird of one of these breeds would have better quality than the yellow-skinned bird with which it was compared. This being the case the general reputation of the white-skinned breed for superior table quality would be better than that of the other—that is, in popular opinion it would be better.

But the point at issue is not whether white-skinned poultry as it runs is better than yellow, but whether a yellow-skinned fowl can be as good as a white-skinned fowl—whether color is an element in quality and flavor. The point is not really one of any particular practical importance in America. The public here has a preference for yellow-skinned chickens. It likes the looks of them better, and most buyers will take them by preference. The public in general does not care a whit about what is preferred elsewhere in color of poultry

Color of skin has nothing whatever to do with quality of flesh in poultry except in so far as the quality of the color, whether white or yellow, is due to and is an index of the condition of the fowl. In any color or shade of skin one may find healthy and unhealthy color—the nice color of a bird in perfect condition, or the dull color of one out of condition and poor in flesh.

Color of skin is not fixed in most breeds—if in any. In almost all, individuals frequently appear that are distinctly not like the type of their breed, and in the characteristic color many gradations may be found—constitutional variations as well as differences due to feed and environment.

Modifying Other Types in the Direction of Table Type

From what was said in the earlier part of this chapter about the table qualities of different breeds, it is apparent that any breed can be made a fair table fowl by breeding for fine-grained meat and by making it reasonably full formed within its type. It is not generally good policy to go farther than this and take a stock out of its breed type and its class. A breeder can easily make Plymouth Rocks as large as Brahmas, but when he does so he takes away from them the distinctive characters of Plymouth Rocks. If he wants Brahmas he should breed Brahmas. A breeder who breeds to standard types is cooperating with every other good breeder who breeds to standard types; one who works away from standard types is working alone, and when his stock begins to go back is entirely dependent upon it and his own efforts to bring it back to its best development.

CHAPTER VIII

Methods of Breeding For Egg Production

Original Laying Capacity of Domestic Fowls—Range of Individual Records at the Present Time—Nature of the Difference Between Good and Poor Layers—Occurrence of High Producing Lines and Strains — Relation of Standard Requirements to Laying Types—Relative Influence of the Sexes in Breeding for Eggs—Methods of Breeding to Improve Size, Shape and Color of Eggs—Quality of Eggs Not a Breed Character.

Early-Laying Strains in America

INTEREST in breeding for egg production has been continuous in America for nearly half a century. Three, or possibly four, well-known laying strains have during that period had histories covering thirty years or more. Besides these there have been at almost any time in the last thirty years a great many persons systematically breeding for high egg production either in flocks or in carefully pedigreed lines, or—much oftener—in short-lived efforts to make heavy-laying strains from hens which have been identified as phenomenal layers. A great many of these minor efforts were successful for short periods; but almost invariably they failed after a few generations, or were discontinued because the results (though really good) were not up to the expectations of enthusiastic seekers for a phenomenal laying strain

The foregoing statement does not refer to strains that have been brought into prominence as a result of their performance in laying competitions since they were inaugurated in this country in 1911. The interest in breeding for egg production especially was greatly stimulated by these competitions and attention was focused more on it, and less on the combination of eggs and meat which had been the object of most American poultry keepers from the early days of improvement in poultry in this country.

GREAT LAYING OREGON EXPERIMENT STATION HEN

This hen made a trap-nest record of 1,187 eggs in six years. She might not win in the highest show competition, yet she is plainly of pretty good Standard type.

With all the interest in the subject of breeding for egg production—or really breeding to increase egg production—outside of the ranks of breeders of standard fowls who have mastered the general problems of breeding for definite results, there is little clear apprehension of the nature of the problem. The writer is aware that this view of the case is not in accord with the popular opinion that breeders of standard poultry are indifferent to egg production. He is equally aware that as it applies to the great majority of those who can really breed poultry—for so-called "fancy" points, or for any definite object, the popular opinion on this point is an inadequately informed and erroneous opinion. It is the aim of this chapter to bring out the pertinent facts relating to this subject from all sources, and to show them in their true relations.

Original Laying Capacity of Domestic Fowls

The idea prevails generally that the laying capacity of the original domestic fowl was only 12, 15 or possibly 18 eggs a year, and that the ordinary egg production of mongrel, neglected fowls is a marvelous improvement upon fecundity in nature, while the high averages of the flocks of good poultrymen generally, and the higher averages obtained from hens that have been bred for eggs and handled to make high records, represent still further triumphs in the improvement and increase of laying capacity.

Those who place the original laying capacity of the fowl at a dozen to a dozen and a half years are, as a rule, persons who hold that the original fowl is the Indian jungle fowl. No authority for this statement of the number of eggs laid by the jungle fowl is ever given. The only specific reference to the subject in early poultry literature is in "The Poultry Book," by W. B. Tegetmeier, 1867, which has a description of the Indian jungle fowl compiled by the author, himself of some repute as a naturalist, from the accounts of a number of naturalists and chiefly from that of a writer referred to as a well-known Indian ornithologist, but not mentioned by name. Some of the statements of this authority appear inconsistent, a fact which always raises doubts as to the credibility of an observer, for the inconsistency of statements after one has written them ought to be apparent to him and to show him that the impression that he has recorded as his observations or as information given by others, were at variance, and there must be error somewhere. If an observer cannot see this and qualify his statement accordingly, and distinguish between what he knows and what he does not know, a careful student of his statement will always note the discrepancies and will accept nothing as certain on the uncorroborated statement of that person.

The authority in this case says that the breeding habits of the jungle fowl are little known, because of the difficulty of getting near enough to the birds to observe them and admits that he is in doubt as to whether the males are monogamous or polygamous. He says that the period of incubation generally begins about June, but adds,

"I have seen eggs, however, in March, and Jerdon says the hen breeds as early as in January and as late as July. She selects for the purpose some secret thicket in the most retired and dense part of the jungle, scraping together a few leaves on the ground by way of nest. She remains as part of the cock's seraglio until some seven, or ten, or a dozen eggs have been deposited. * * * These particulars I gathered from native informants; but I can add from my own experience that either the season of incubation is uncertain, or that THE HENS LAY IN THE COLD WEATHER WITH NO MORE ULTERIOR VIEWS THAN THE DOMESTIC BIRDS, for both in February and March I have heard them emit that peculiar cackle by which everyone knows a hen in the farm yard proclaims to the good housewife a fresh acquisition to her larder."

The conclusion that we are warranted in drawing from this is that the Indian jungle fowl in modern times has a laying period covering about six months as shown by the reports of natives most familiar with the life of jungle birds, and that a European naturalist who saw something of the jungle fowls in India, and tried to learn what he could of them from natives (bird catchers), inferred from their reports and from the fact that he had heard the hens cackling as hens do after laying, that their production was not at all limited to the few eggs a hen could incubate once or perhaps twice in a season. The reasonable inference from the fact that, while according to native bird catchers, the incubation season generally begins about June, according to European observers it may be as early as January, is that the hens probably begin nesting in January, but that the natives take the eggs if they find them until about June, and after that refrain from doing so that the birds may produce enough young to keep up the stock and supply eggs for the hunters next year. Under such conditions the broods seen early in the season would be those of hens whose nests had not been found and robbed, by either men or other enemies. If the fowls are laying more or less regularly through so long a period as that it is entirely reasonable to suppose that they would in many cases lay as many eggs as the average domestic hen that is not well fed and cared for.

But we are not left wholly to suppositions on that point. There is more recent and definite testimony as to the probable laying capacity of jungle fowls. At the National Poultry Conference in England in 1907 a contributed paper describing attempts to cross Ceylon jungle fowls with domestic fowls was read. According to the account the extreme wildness of the jungle birds and especially of the females made the work very difficult. No statement as to the numbers of eggs laid by any wild female in a season is made; but after recounting the experience of an experimenter with one of the first half-breed hens, the writer of this paper, J. L. Thomas, of Colombo, Ceylon, says:

"The first thing that strikes one is *the large number of eggs laid* by this one hen. Since June 1, 1906, up to date (June 1, 1907), she has laid NO LESS THAN ONE HUNDRED EGGS, a very good average for an ordinary hen. Her mother, a common mongrel domestic, probably never laid more than sixty or seventy per annum."

The italics in the above quotation are Mr. Thomas', the capitals are this writer's. We shall see, a little farther on, that according to the most commonly accepted and latest scientific opinion on the point, the inheritance of "fecundity," or of laying capacity, is through the male. (The author does not accept that opinion as a general fact, for reasons which will be given in the proper place.) According to that view the dam of the jungle cock that sired this half-breed hen must have been a bird of laying capacity equal to that of the ordinary domestic hen. Denial of the theory that laying capacity is transmitted to hens only through the sire does not imply that the sire does not often transmit to his daughters the laying capacity of his dam. Whatever laying capacity the dam of the jungle cock in this case may have had, it is certain that the wild cross did not diminish productivity. To place the facts fairly before the reader it should be said that the reference to the laying of the mongrel hen does not show the capacity of that hen at all. The conditions under which the hybrid hen was kept in the experiment were more favorable to a good egg yield than the conditions in which ordinary mongrel fowls in that part of the world live.

Further confirmation of the view that the jungle fowl has a capacity quite equal to the ordinary domestic stock under similar conditions as to nourishment and other matters affecting laying is found in observations of the laying capacity of various other wild birds in captivity. The wild Mallard Duck in captivity lays from eighty to one hundred eggs. Quail under observation in scientific experiments have laid nearly a hundred eggs. And such small birds as the wryneck and the house sparrow have been known to lay, in the case of the former 48 eggs, and in the case of the latter 51 eggs in succession, when the eggs were removed as fast as laid.

With all these facts before us we may definitely dismiss the idea that the original wild species of the domestic fowl, whether that was the jungle fowl or such another type as the author has described in Chapter II, was a bird capable of producing only a small and limited number of eggs. All the evidence confirms the conclusion that the original species was capable of giving immediately in domestication more eggs than the average hen lays at the present time. Instead of capacity to produce 12 to 18 eggs a year, its probable capacity may be taken at from 80 to 120 eggs a year. This production, it may be noted, bears about the same ratio to the higher production of stocks that are bred and fed for eggs that the size assumed in Chapter III as that of the original fowl bears to the increases in size that have been made. It gives us a much better foundation to build on than so insignificant a natural capacity as would exist in a species not capable of producing more than 12 to 18 eggs a year.

Actual Present Laying Capacity of Domestic Fowls

Until recent years it was the universal belief that the laying capacity of a hen was limited by the number of ova in the ovary, which number was as definitely fixed as the number of legs or wings, or of toes on the feet of the hen. Estimates based upon records and careful estimates of the egg production of hens that had produced eggs through relatively long terms of years placed the number of ova at probably 600 to 800. It was the general idea—based on this view of the limitations on laying capacity—that the best practice in handling stock kept for laying only was to force egg production and get the eggs the hen was capable of laying as quickly as possible. The idea was that if a hen, kept in good health and laying condition and living to an age of five, six, seven years, or more—laying possibly 12 to 15 dozen eggs in her first laying year and a smaller number each year afterward—would with ordinary handling, pay something over the cost of her feed and keep for, say, three or four years, by feeding to force egg production the proportion

of her possible eggs that the hen would lay within any specified time would be greatly increased; but that eventually—if the hen was kept long enough and continued in normal health—she would have laid all the ova produced in her ovary, and, though she might live in thrifty condition years longer, would be incapable of producing eggs, because the ovary had no power to produce ova in addition to the stock of them with which it was originally furnished.

On this theory breeding to increase capacity for egg production, while it was not formally stated just that way, was based on the idea that the number of "seed" ova in hens, although fixed in the individual was variable—like other characters—in reproduction; and that selection of the best layers and the sons of best layers to reproduce their kind operated to increase the capacity for egg production, just as selection for any visible character operates generally to increase or intensify, or otherwise improve the character in any desired direction. On this theory, and on the suppositions that the usual number of ova in hens at the present time is from 600 to 800, and that the rate of production bears a fairly constant ratio to the total number of original ova (because of a normal tendency to produce eggs at a rate that would exhaust the supply always at about the same age of a hen), a hen to lay normally 300 eggs in a year would need an original supply of ova of possibly 1200 to 1500. By forcing, a hen with a much smaller supply might produce 300 eggs or more in her first laying year.

No one actually knew the number of ova in any case, and no one (as far as known) ever made any attempt to count them until 1911 when Pearl and Surface, at the Maine Experiment Station, examined a number of hens that were laying poorly, and counted the number of ova attached to the ovaries of these hens, that could be seen with the naked eye. It was found that in these poor layers the number of ova visible to the naked eye was in the lowest instance much greater than had been supposed was the case with ordinary good layers, and that every hen examined then and afterwards had—of ova visible to the naked eye alone—far more than enough for all the eggs that any hen had ever been known to lay, while the hen with the highest number had ova enough in sight to enable her to produce 360 eggs a year for ten years. The report of these observations as given in Bulletin No. 205 of the Maine Experiment Station is shown in the accompanying table. It will be noted that Barred Plymouth Rock No. 1367, that when nearly a year old had laid only 34 eggs, had 2,306 visible ova; and that White Leghorn No. 3833, that at the age of a year and a half had laid only two eggs, had over 2,000 visible ova.

These facts, and others that are shown in the table, completely explode the idea of actual egg production being in any way limited by the original capacity of a hen to produce ova. They show that the original capacity so far exceeds the highest production possible within the working life of a hen that there is no occasion to breed to increase that capacity even if there is a possibility of it. It should be observed that besides ova visible to the naked eye every ovary of a hen contains numerous more that are not visible to the eye, and which no one has attempted to count. Indeed there is no practical interest in doing so, for what has been learned as to the visible numbers and the existence of a mass in more elementary stages shows the ovary not as a storehouse of a specific supply of ova, but as an organ for the production of ova which in every case produces them in enormously greater numbers than any hen can use. These facts open up some other questions for investigation, but they make absurd all theorizing in relation to breeding for egg production (and feeding for egg production as well) that makes laying, or capacity to lay, dependent upon the capacity of the ovary.

Table Showing the Numbers of Visible Ovules in the Ovaries of Hens Examined at the Maine Experiment Station

Bird No.	Breed	Hatched	Killed	No. Eggs Laid in Life	Total Visible Ovules
8021	Barred Plymouth Rock	June 1, '10	March 28, '11	10	1228
8017	Barred Plymouth Rock	June 2, '10	March 30, '11	10	1666
8030	Barred Plymouth Rock	June 1, '10	March 10, '11	7	914
8005	Barred Plymouth Rock	June 2, '10	March 14, '11	17	1174
1367	Barred Plymouth Rock	April 28, '10	April 4, '11	34	2306
8018	Barred Plymouth Rock	June 2, '10	March 24, '11	16	1194
8009	Barred Plymouth Rock	June 2, '10	March 24, '11	15	2101
8010	Barred Plymouth Rock	May 19, '10	March 17, '11	19	1576
425	Barred Plymouth Rock	Mar. 30, '09	July 7, '10	23	1521
3546	White Leghorn	May 18, '09	Dec. 20, '10	198	2452
2067	White Leghorn	May 28, '09	Dec. 15, '10	197	3605
3453	White Leghorn	May 21, '09	Dec. 13, '10	10	1701
3833	White Leghorn	June 14, '09	Dec. 22, '10	2	2145
52	Cornish Indian Game	April 21, '09	July 12, '10	52	1550
71	Game—Rock Cross	Mar. 31, '10	March 20, '11	124	2000
	Guinea		Jan. '11		765
	Guinea		Jan. '11		586

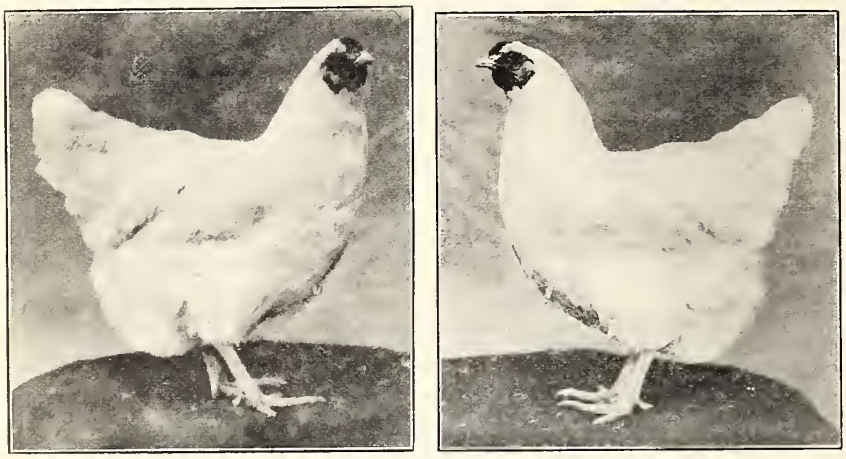
What Is the Nature of the Difference Between Good Layers and Poor Layers

Although it has been thus conclusively demonstrated that the differences in egg production which are noted in fowls, in strains of fowls, and in a general way between types and breeds of fowls, are not due to and in proportion to differences in capacity to produce the ova which are the nuclei of eggs, the fact of such differences is one of the most obvious of common phenomena of poultry keeping. In a great many cases a difference as observed may be accounted for by differences in care and feeding of birds of the same breeding, or by differences in the vigor and vitality of individuals and flocks; or by differences in the temperament and activity of fowls which affect their physical condition. It is, indeed, by no means certain that in a full analysis of causes it would not appear that the difference in egg production is always due to such causes as these. But in the present state of knowledge of the subject, with the observations of practical poultrymen along rather general lines and mostly limited to notice of the facts, and with scientific studies of the subject befogged by the effort to treat the degree of productivity (fecundity) as a heritable "unit character" and to show that as such it is inherited in accordance with Mendelian principles, this cannot be positively asserted.

What appears on the face of the general case is that with the ovary of the hen always (normally) containing more visible ova than are required to produce all the eggs that any hen was ever known to produce in the period it is profitable to keep the best laying hens for egg production, good care, a sufficiency of feed and vigor of constitution which enable hens to lay heavily for long periods are not the sole factors in egg production. The other factor (whether it is simple or complex) is plainly something which stimulates the ovary to activity somewhat, perhaps, as hunger or the sight or

smell of food may stimulate the digestive organs. Feed taken into the system of a fowl in excess of maintenance requirements does not go to egg production unless the reproductive organs are active (are functioning) and require and can use it. There is a difference in the intensity of the tendency to activity of the ovary which may be regarded as initiating and giving the impetus to egg production.

It is not necessary for the practical breeder's purpose to be able to analyze, describe and explain this tendency in biological language. Its existence is shown in its effects. Practically considered, the habit of continuous laying through long periods has its beginnings in the capacity of birds to continue to produce eggs from which they can produce young again and again after eggs have been destroyed by their enemies. It is a case to which the doctrine of the "survival of the fittest" applies beautifully. Even in the wild state the birds that will go on laying after their nests have been despoiled again and again will in the end leave the most progeny, and in the repeated operation of this process of natural selection the laying capacity of the race will be increased. On these grounds we might expect the wild jungle fowl of Ceylon to be actually a better layer than a mongrel bred in domestication without either feeding or breeding for good egg production, and the union of wild and mongrel blood to improve laying. It is not known whether the mongrel in that case could lay better than she was supposed to have laid. But taking the case as there stated, natural selection was more potent to increase "fecundity" than the conditions of domestication.



TYPICAL WHITE WYANDOTTE FEMALES OF R. A. RICHARDSON'S HEAVY LAYING STRAIN

Left, pullet with a winter record of 132 eggs in 175 days. Right, hen with a year's record of 252 eggs.

The only practical way to learn or to measure capacity for egg production is by the eggs produced—due consideration being given to the apparent or probable effects of feed and other conditions upon egg production. There is nothing that is known in regard to the relative laying capacities of different hens that gives good grounds for the theories that are more or less widely popular both in scientific and in novice circle that differences in laying capacity are inherited in any other manner than differences in capacity for growth, or for the development of any character. Nor is there the slighest ground for supposing, as has been stated by one scientific investigator, that "fecundity" may behave differently in transmission in different breeds of fowls.

There appears to be some degree of reciprocal relation between the tendency of the ovary to activity and the capacity of the body—of all the other organs functioning together—to take the ova as produced by the ovary and carry them to complete development; but, as in nearly all cases of correlation of characters, there does not appear to be any necessary correlation here. The ovary may tend to produce eggs faster in one case than the system can complete them, in another case an apparently vital body may have a sluggish ovary containing thousands of ova yet so constantly dormant that only at rare intervals and in short series does it develop ova to the stage at which they are detached from it, and, passing into the oviduct, receive the additional material required to finish eggs. Demonstrated capacity to produce eggs heavily and continuously is evidence that whatever functions or "factors" are contributory to egg production are correlated. Selection of heavy layers to produce heavy layers is effective with certain limitations, just as selection for shape or color or any other point is effective; but in the matter of egg production the limiting factors, circumstances or conditions are generally more pronounced and their effects appear immediately to complicate the phenomena of inheritance.

Thus in the case of two hens that are about equally heavy producers: One may make her product without impairing her vitality in any appreciable measure, either as seen in her apparent condition, or as indicated in the fertility of her eggs or in the vitality of the chickens hatched from them; while the other shows in every one of these respects the effects of heavy egg production. In fact, heavy egg production is so generally unfavorable to the reproduction of as good laying capacity in the next generation that the practice obtains widely among those breeding for the greatest possible egg production of breeding only from hens in their second or third years. The idea is to find out in her first laying year what the hen can do, but not breed from her because of the known general effects of heavy egg production upon fertility and the vitality of the progeny. Then when the year's records have been made to select the hens wanted for breeders the next season, and discontinuing all practices designed to secure the highest possible egg production, try to put them in the pink of condition to use for breeding, and feed only for moderate production while they are used for breeders.

The real value of this plan depends largely upon the judgment of the breeder in regard to the true condition of his heavy layers at the beginning of the season in which he wants to use them as breeders, and upon the severity of his selection for this purpose. In individual cases the capacity of the hen to transmit her characters to her progeny may also affect the result, but in general it may be assumed that if a hen is in prime breeding condition in the breeding season, she will contribute her normal share to the laying capacity of her offspring, just as to other characters and combinations of characters. The advantage of this practice is most manifest where stock is to be sold on the record of performance of its immediate ancestry. That the method actually works better in prac-

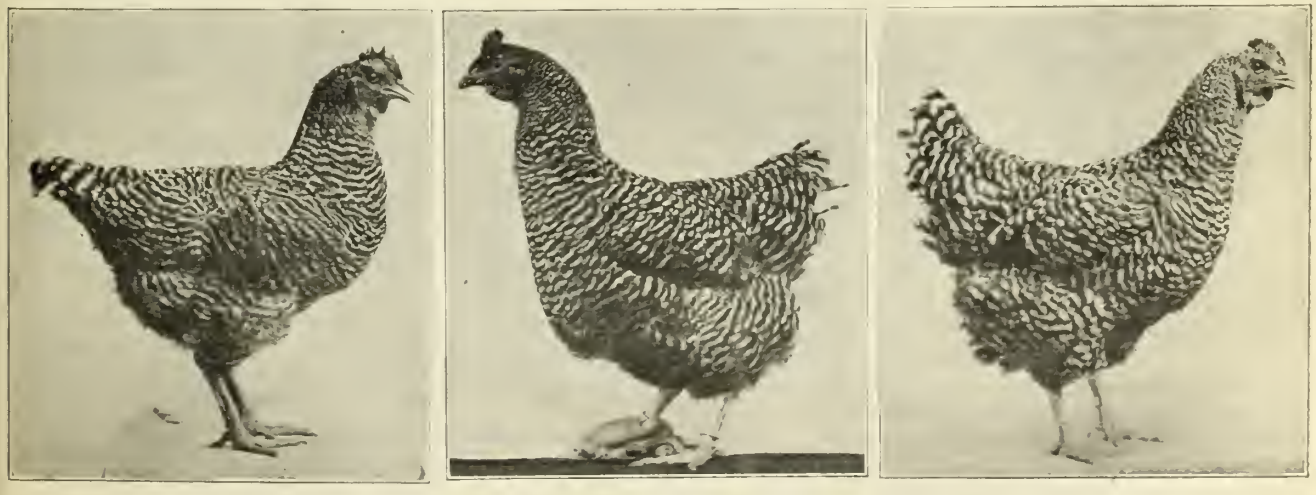
tice on any extensive scale than what is called "mass breeding"—that is, breeding from the specimens selected for appearance and for performance as indicated by high flock averages—has never, so far as the author knows, been shown. On general principles, and in view of the difficulty of getting all the good qualites desired in one specimen, and in view also of the well-known fact that the greater number of phenomenal layers come from dams that are good but not extraordinary layers, it is not good policy to keep pullets of unusual promise as breeders out of the breeding pens the first season. To do so means in most cases the loss of about half the possible breeding value of the bird.

High-Producing Lines and Strains

Given the combination of extraordinary tendency to activity of the ovary, vigor, and the constitution to stand heavy egg production with little or no impairment of vitality, and prepotency in the transmisson of these qualities, high-producing lines may be established just as lines high in standard excellence are established. Many efforts to make such lines will fail, but a proportion of them are bound to succeed if the general principles of line breeding are observed; and until heavy laying affects vitality (as it inevitably must after a time) such stock will, under any conditions favorable to egg production, lay better than other stock in which the combination that makes for high egg production has not been brought to a like degree of perfection. But from the fact that a heavy-laying line is constantly subjected to a drain on vitality, such lines usually remain at or near the summit of their excellence for only a few generations. Their average duration is probably not to exceed two-thirds of that of the average standard line of superior quality. Hence, to maintain a good-laying strain with the lines or families established and in the making that is necessary in a commercial laying strain, requires the same systematic, well-considered, persistent effort as to keep up a strain of standard stock. When the breeder of a laying strain relaxes his attention to superficial points that in no way affect laying he seems to about equalize matters as to the amount of work required to maintain strains for the different purposes. Yet, if the number of marked and long-continued successes in breeding laying strains is to be taken as the measure of difficulty, it must be admitted that it is harder to make and hold the reputation of a laying strain than that of an exhibition strain.

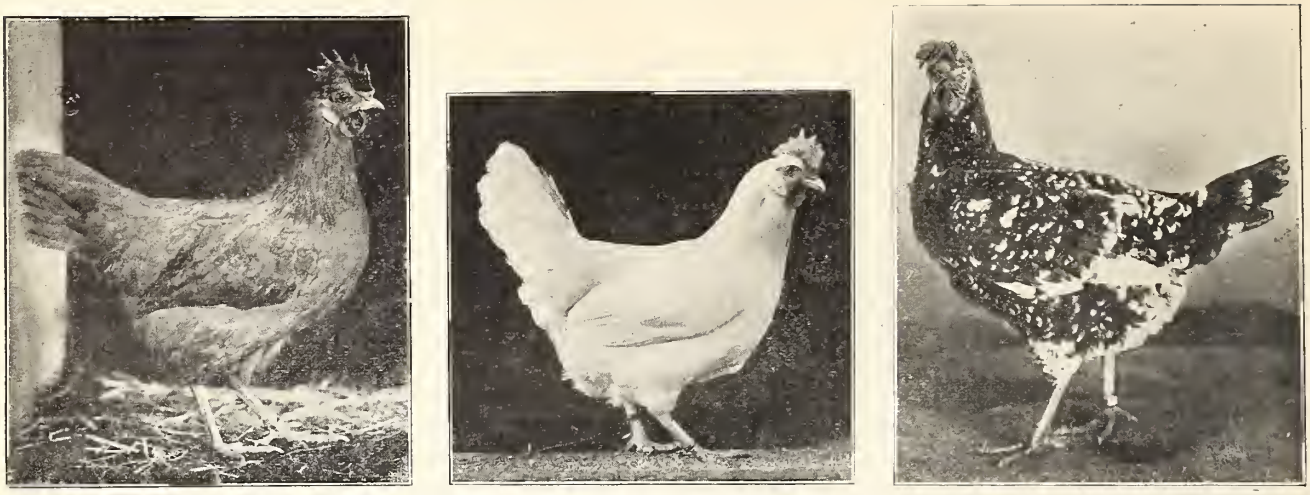
Of the laying strains that have had histories in America covering long periods of time it should be said that their reputations were in two cases—the Wyckoff White Leghorns and the Parks' Barred Plymouth Rocks—made in the first place on high averages for large flocks of layers in the hands of the breeder, and maintained not so much on extraordinary production but by the consistency of better-than-average laying in the hands of buyers. This last was true also of the other two flocks referred to in the beginning of this chapter, neither of which ever made really extraordinary large flock averages—and neither of which was in fact as good in standard type as the two just named. One of them, the old Rudd Orocco strain of Barred Plymouth Rocks, was really a general-purpose strain superior to the average in both meat quality and egg production. The other, the Maine Experiment Station stock of Barred Plymouth Rocks, was rather undersize for Plymouth Rocks, and of a common (but not from the Standard point of view a good) Rock type. The reputation of this stock for egg production came mostly from the prominence given it by the reports of experiments with it. As to the published records of its actual performances, these were not remarkable in the averages, because the averages always included records of a considerable number of poor layers which a breeder would have discarded. The stock here, however, was trap nested and many high individual records were obtained at a time when such records were scarce, and as the stock distributed from the institution was always from high-laying lines or individuals it generally gave better than average results.

The status of laying strains brought into prominence in the laying competitions that have been held in this country since 1911 is somewhat different. The reputations of these strains are based on the performances of small numbers of hens, presumably the best the breeder could select from his stock, given much more attention than hens ordinarily get, and conditions that, with the care given, are much better than the average condition for laying flocks. It is not to be expected that the high records made under such conditions would be maintained in general, and as far as can be observed—with occasional remarkable records—the general experience with the strains brought into prominence by the competitions is the same as with the older laying strains. They give much better than average results but still throw many poor producers.



THREE GREAT LAYERS OF J. W. PARKS' STRAIN OF BARRED PLYMOUTH ROCKS

Left, "Miss Graduate", record 313 eggs; center, "Lady Martha", record 323 eggs; right, "Miss Smarty", record 325 eggs.



THREE GREAT LAYERS IN THE MEDITERRANEAN CLASS

Left, "Missouri Belle", Buff Leghorn, with record in Missouri competition of 211 eggs in eleven months; center, "Joan of Arc", White Leghorn bred at Purdue Experiment Station, made a record of 1,000 eggs in seven years; right, Ancona hen with year's record of 236 eggs in Missouri competition.

Relation of Standard Characters and Qualities to Laying

This subject has been mentioned in a number of special connections in earlier chapters. Here it calls for special consideration—particularly so because of the extent to which the exploitation of laying competitions and the stocks winning at them was at first turned to systematic condemnation of standard-bred poultry. When the first contests were inaugurated here the American contestants were in precisely the same situation with regard to the selection of hens to perform in such a competition as a novice in the exhibition room, and most of them had not given much attention to special breeding for egg production. The interest in contests was outside rather than inside the specialized poultry interests. The breeder to gain most distinction in these contests was an English breeder who for a decade or more had been giving special attention to breeding for eggs regardless of points not affecting volume of egg production, and to selecting birds for such competitions. This breeder's stock had numerous bad faults from a Standard point of view. In a section of the agricultural press, in some newspapers containing poultry departments, and to some extent by writers in the poultry press who took their cue from these sources, the idea was diligently circulated that the faults of the foreign birds were characteristic of high egg producers, and that standard stock free from such fault was not and could not possibly be good-laying stock.

There were in the earliest contests, and much more numerously in succeeding contests, many birds of standard type with records that showed the fallacy of this view, but the propaganda against standard birds and their breeders was pushed with nothing short of virulence until the error had gained such a footing in uninformed public opinion, with results so unfair and injurious to breeders of standard poultry, that promoters of competitions saw the necessity of taking measures to correct it. In most of the competitions at the present time the birds are scored for standard points, and the reports issued give particular attention to the fact that the competing birds are very largely hens of high, and occasionally of superior quality when judged by the Standard.

There is no necessary relation between capacity for high egg production and beauty as judged by accepted standards for exhibition fowls, except in those points where beauty is associated with the form or expression of characters which affect the capacity of a fowl for performance and endurance. A weak, frail-looking hen will not, as a rule, be a heavy layer. Occasionally such a hen lays a remarkably large number of eggs for a time, but her eggs are apt to be imperfect, light in substance and thin or soft shelled.

Whatever she may lack in the refinements of the superficial characters of the variety to which she belongs, or however she may fail in correctness of type for that variety, a hen that is a consistent high producer of eggs of normal size and structure, and maintains for several years a good measure of vitality, will always have a certain measure of attractiveness as a hen without regard to breed, variety, or special type characteristics. And in the individual hen kept for the purpose simply of producing eggs for the table all superficial faults may be overlooked. There are literally millions of hens of this kind in the cull flocks of standard-bred fowls in this country that are kept for laying only.

But when it comes to selecting hens for breeding, the reproduction of the faults of such hens should be tolerated only if the faults are the necessary accompaniment of good-laying capacity and power. There is no excuse for, and neither art nor reason in breeding hens with ugly features when equally good layers can be found that are free from seriously objectionable faults of appearance. Such good-looking good layers can be found in abundance, and many hens of phenomenal standard quality are also phenomenal layers. There is no necessary correlation of the two things, neither is there any essential incompatibility between them. To have a standard-bred flock of high-producing characters it is only necessary to select good layers that have the other characters required. In the beginning of such selection from a previously unselected strain, the proportion of birds that have the desired combination may be very small—just as is the case in selecting for any combination of desirable points—but with careful selection and close breeding a stock can soon be brought to a stage at which all the individuals actually required for breeding can easily be obtained among the good layers free from serious faults.

Relative Influences of the Sexes in Breeding for Egg Production

One of the by-products of experimental studies with Mendelian formulas is a theory of what is called "sex-

THREE GREAT LAYERS OF THE GENERAL PURPOSE TYPE

Left, Single Comb Rhode Island Red hen making a year's record of 261 eggs at New Jersey Experiment Station; center, high-class exhibition Single Comb Rhode Island Red hen, with a private record of 898 eggs in three years, bred by Lester Tompkins; right, Buff Orpington hen with year's record of 226 eggs in Missouri contest.

limited inheritance" which seems to arise from confusion of the phenomena of different color patterns in the colors of the sexes, and the phenomena of inheritance which the Darwinians call "cross heredity"—that is, the inheritance by a male of the character of his dam rather than of his sire, or by a female of the character of her sire rather than her dam. Observations on so-called high-producing and low-producing hens at the Maine Experiment Station were interpreted as showing conclusively that high-producing hens did not transmit their capacity for laying to their daughters, but did transmit it to their sons. The line of reasoning that arrives at this conclusion is from the practical poultry breeder's point of view invalid in itself, and is further defective in that the statistical data upon which it is based are incomplete and are divided for analysis in an artificial and arbitrary way.

Briefly stated, the case is as follows: In classifying hens as relatively high producers or low producers the investigators took a standard of 30 eggs produced by pullets hatched in April and May before March 1 of the following year. With the division of hens into high and low producers on this basis, and a like division of their daughters by males from dams of high or low fecundity, the following conclusions were reached:

"High fecundity may be inherited by daughters from their sire, independent of the dam. This is proved by the numerous cases * * * where the same proportion of daughters of high fecundity are produced by the same sire, whether he is mated with dams of low or of high fecundity.

"High fecundity is not inherited by daughters from their dam. This is proved by a number of distinct and independent lines of evidence, of which the most important are: (a) continued selection of highly fecund dams does not alter in any way the mean egg production of their daughters; (b) the proportion of highly fecund daughters is the same whether the dam is of high or of low fecundity, provided both are mated to the same male; (c) the daughters of a highly fecund dam may show either high fecundity or low fecundity, depending upon their sire; (d) the proportion of daughters of low fecundity is the same whether the dam is of high or of low fecundity, provided both are mated to the same male.

"A low degree of fecundity may be inherited by the daughters from either sire or dam, or both."

The importance to us of the value of the above findings is that they have been made the basis of the theory, advanced as resting upon indisputable scientific experimental evidence, that hens cannot inherit high fecundity from their dams, and that the sons of high-producing hens will invariably produce daughters of high fecundity no matter whether mated with good layers or poor layers. The latter part of this theory is not in the above quotation, but is a misinterpretation of statements in it which I think most readers find are confusing and difficult to get clearly in mind. The objections to the above conclusions, and to the theory as in part contained in them and in part a misapprehension of them are:

A production of 30 eggs before March 1 by pullets hatched in April and May of the preceding year is not high egg production, and it is absurd to take the same date to determine this point for pullets with a range of two months difference in age. The only proper way to determine relative fecundity is to take the records of pullets of the same age (at the same age). The method of taking this data really leaves the further observations upon it of no value for the purpose. But, even if this data were as they should be, the conclusion drawn from them are faulty in some important respects, and even with their faults they do not show what they have been misinterpreted as showing.

Of the three direct statements as to the inheritance of fecundity:

1—"High fecundity may be inherited by daughters from their sire, independent of the dam.

2—"High fecundity is not inherited by daughters from their dam.

3—"A low degree of fecundity may be inherited by the daughters from either sire or dam, or both."

Nos. 1 and 3 are in accordance with the general law of inheritance and with common observation, but the fact cited as proof of No. 1 is not proof of the practical kind. The proof in this case is not the mean or average production of eggs by all the progeny of an individual, but the production of one or more high-producing hens by a sire of a high-producing strain or line from a dam of known poor-laying quality.

Statement No. 2 is not in accord with the general law of heredity, nor common observation. It has never appeared in case of any character the behavior of which in heredity could be clearly seen and the characters of parents and offspring directly compared, that such character might not be transmitted by either parent to the off-

spring of either sex. The last three specific statements (b, c and d) made as the most important of "a number of distinct and independent lines of evidence" which prove No. 2 are, as anyone who compares them critically can see at a glance, merely three versions of the same statement.

The statement a is invalid for the same reason as the proof offered in connection with No. 1. The only possible proof that high fecundity is not (and cannot be) inherited by daughters from their dams would be the proof that a good layer never produced a good-laying daughter unless mated with a male of a good-laying strain. This proof is in the nature of the case impossible to obtain. The expectation in accordance with the general law of heredity is that if a good layer is mated with a male of poor-laying stock she would produce daughters generally inferior to herself as layers, yet there is no reason to suppose that a hen in such a mating could not produce some daughters, and even a large proportion of daughters as good layers as herself.

It is not even claimed in the evidence given as proof of the statement that high fecundity is not inherited by daughters from their dams, that such cases were not found. On the contrary, all these statements refer to "proportions," "means"—averages which seem to imply that such cases were found. Considering the standard taken in this case for high production, however, it is idle to go farther into a discussion of that point.

Besides accepting without qualification or reserve the assertion that high-producing hens are incapable of transmitting their quality to their daughters, those who take such conclusions as are offered in the above quoted extract construed the references to the transmission of fecundity by males of high-producing lines or strains to mean that every such male was a sure producer of daughters equal in inherited fecundity to the females of his line and specifically to his dam. That conclusion is not one that can be drawn either from a clear understanding of what is stated in the quotation or from any known phenomena of inheritance. The view here of the transmission of fecundity through the male is that while the female does not transmit it to her daughters, the male may or may not transmit it. As the theory is commonly presented the uncertainty of transmission of fecundity by males of high-producing lines is not brought out so that the case is clearly understood until the person expounding it is cross questioned by practical breeders. Then it comes out that certainty as to the breeding quality of males depends on the practical test, that no matter how well bred a male may be for fecundity, no one can know until his daughters have been laying long enough to show their quality how he will breed in this respect.

There are absolutely no valid grounds for assuming any difference in the capacity of male and female to transmit to any or all of their offspring any quality or combination of qualities or characters upon which capacity for egg production depends. The practical methods of breeding for egg production are based upon just the same general principles as the methods of breeding for exhibition points or for the table. To increase egg production we breed systematically from the best producers that are also able to reproduce their quality. *

Relation of Type and Size to Productivity

Two features of type are commonly regarded as being closely related to fecundity—the shape of the body and the size of the comb: the size of body is also widely regarded as influencing egg production, the common opinion being that in every breed the medium and small hens are the best layers. As the idea that large-combed fowls are better layers than others is the oldest and most popular it will be considered first.

This idea plainly has its origin in the fact that when a hen is laying her comb is much larger than when she is not. There is plainly this much correlation between the condition of the comb of fowls and their reproductive organs, that when these organs in either male or female are functioning actively there is more blood circulating in the comb and it is firmer in texture and of higher color. But that does not necessarily mean that the comb only shares in this increased circulation. Increased activity generally accompanies the production of eggs. If the rest of the skin of a hen is affected in the same way and in the same degree as that of the face, comb, and wattles it is not observed because the skin is covered with feathers. As a matter of fact, the skin on the side of the shank does frequently show a little higher color when the sexual organs are active.

Nor is the change in the appearance of the comb always conspicuous. In many hens with small combs very close observation, and sometimes the exercise of a little imagination, is required to detect any difference in the size and color of the comb when the hen is laying and when she is not. This does not refer to poor layers, but to remarkably good layers. The writer had for a number of years in the 'nineties a strain of Barred Plymouth Rocks of an exhibition stock both then and now well known that were uncommonly good layers, yet their combs were so small that the increase in size and intensification of color as the pullets approached laying maturity would hardly be noted until just as they were beginning to lay, and often could not be noted at all. The same thing is often seen in Brahmas and in Games. On the other hand, many large-combed birds are indifferent or poor layers. There is no regularity of correlation. One can breed any kind of comb he likes and get good layers with it, provided the comb is normal—not the peculiarly undeveloped comb of a bird that is not sexually normal.

Between shape of body and potential capacity to produce eggs there is no correlation, but there is a very important relation between shape of body and actual capacity for heavy egg production. A hen to lay well and continuously must be built with capacity to carry feed in process of digestion and assimilation, and eggs in process of formation beyond that of the average hen. She must be able to carry these burdens easily, to do a good deal of moving about and take a considerable amount of exercise without feeling the wear and tear of what is really hard work. This ability is not limited to one pecu-

* NOTE—Since this chapter was written I have learned of several cases in careful pedigree breeding where it is demonstrated that high-producing hens transmit their quality in that character according to the common law of inheritance. Reports from the U. S. Government Poultry Farm at Beltsville, Md., referred to in a lecture at the Boston Show, in January, 1920, by Mr. Joseph Quinn, in charge of the experimental records at the farm, showed not only that hens transmitted high-laying capacity to their daughters, but that when hens of varying laying capacity were mated to the same male the grade of capacity of the pullets varied with the differences in laying capacity of their dams.

Another notable case in point is found in the heavy-laying strain of White Wyandottes developed by R. A. Richardson of Haverhill, Mass. Mr. Richardson began line breeding for egg production about 1902 with three hens of laying strains well known at that time. Two of the hens he started with proved good producers of heavy layers. He bred lines from both for a few years, then discarded all lines but those from one of the original hens which was distinguished for steady heavy laying, and for producing heavy layers when mated with males that, as shown by results with other females, did not transmit high fecundity to their daughters.

"QUEEN UTANA" A UTAH EXPERIMENT STATION S. C. WHITE LEGHORN HEN THAT LAID 816 EGGS IN FIVE YEARS AND THE EQUIVALENTS OF HER PRODUCT YEAR BY YEAR FOR THE PERIOD

First year, 195 eggs; second year, 193 eggs; third year, 138 eggs; fourth year, 161 eggs; fifth year, 129 eggs. Total, 816.

liar type. It may exist within quite a range of types, but there are certain types and tendencies which are unfavorable to it, and where these are present continued good egg production is a matter of adapting conditions and care to overcome them.

The conventional idea of the perfect egg type is a wedge-shaped bird, wide and deep in the posterior parts of the body where the eggs are carried, active and strong, but with as little flesh as may be with strength to carry its load and scratch for feed. While such a type is sometimes found in remarkable layers, it is not an ideal egg type, but an extreme type, and like all extreme types easily develops so far that its peculiarity becomes a fault. The favorite wedge shape, or something approximating it, will appear in profile in almost any hen while she is laying even fairly well.

The proper time to judge the type of a hen is when she is not laying—in a pullet just before she begins to lay, in an older hen at any time that she is not heavy with eggs. The body in this condition should suggest rather than realize the idea of the wedge shape. It should be well balanced, with good breadth across the back at the shoulders as well as at the hips, and at least moderate depth and fullness of breast. Many hens that meet these specifications very well are sometimes described as wedge shaped—as carrying the smallest possible amount of flesh and muscle—and in other terms which are differently interpreted by different people according to the characteristics of the type with which they are most familiar. One who is best acquainted with meaty types will describe what is really a medium well-fleshed bird of its breed in terms which to breeders of the breed convey the idea of the type reduced almost to skin and bone.

The moderate egg type of this kind is a better type than the extreme one because it has flesh enough to give it more reserve force for emergencies. It is the common experience that the lightweight egg breeds are much more affected by severe weather and by sudden changes in the weather than the medium and heavy breeds. It is this that cuts their egg production so often in winter—the shortness of feather, and in some cases the tenderness of the combs of the birds contributing to the same result. It is not desirable to lengthen the plumage—as could easily be done by selective breeding—because it is the short plumage that gives the type an advantage in summer egg production; but it will be found that hens of the lighter breeds that while of rather light build are fairly well fleshed will stand cold weather and unfavorable changes of weather much better than those that are not, and their egg production will be less affected by bad weather.

Queen Utana POULTRY RECORD U. A. C.

Hen No. 96 U.

Sire No. ..... Hatched Apr 15 1909. Hatched by Inc, ~~Hen~~

Dam No. ..... First Egg Nov 28 1909. Brooded by Brooder ~~Hen~~

EGG RECORD

Year	Pen No.	Nov.	Dec.	Jan.	Feb.	Mch.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
09-10	C c	5	12	16	15	20	24	22	22	23	21	15	0	195
10-11	" "	0	12	7	17	23	18	24	22	22	23	21	4	193
11-12	C 3	0	0	12	20	20	19	22	20	22	3	0	0	138
12-13	C 1	6	18	13	8	19	24	19	11	5	18	18	2	161
13-14	C 7	0	0	13	15	10	21	21	11	18	14	6	0	129

Total-816

REPRODUCTION OF RECORD CARD OF "QUEEN UTANA"

Showing her performance month by month for five years.

In the medium and heavyweight breeds the development of laying strains usually tends to undersized and spare types, not because they are superior to much more substantial types, but simply because people breeding for egg production have generally neglected other qualities, and where the selection is relaxed the tendency is always to revert to a mediocre type. It is generally held that the medium and small birds in any breed are better layers than the large ones. The correctness of this view depends somewhat upon the way one looks at the relation of the poultry keeper to his work. The writer's experience and observation have been that for skilled poutrymen who give their hens really expert and constant attention medium to large birds, and large birds that are not coarse, are the more reliable long-term producers; but that where skill is lacking and attention indifferent, the smaller and lighter birds will give better results. The difference is

due to the fact that the large birds generally are most prone to put on fat under the heavy feeding that is necessary when high egg production is obtained.

Breeding for Size, Shape and Color of Eggs

Breeding for extraordinary high egg production has nearly always been carried on without particular attention to the size, shape and appearance of eggs. Very heavy layers are likely to lay rather smaller eggs than the more moderate layers of the same stock, and smaller eggs when they are laying their best than when their production is lighter. Even in ordinary good laying when the eggs are produced in short cycles of two or more consecutive days the weight (and size) of the egg is almost invariably a little less each day until—if the cycle is a long one—a minimum is reached which the bird rarely goes below. Practically there is no advantage in heavy egg production unless the eggs generally will class in size as the best ordinary market grade. They should weigh about two ounces each, about 23 to 25 ounces to the dozen. This is a little small for eggs for fancy grades, but if a hen is a big producer and will lay 90% of her eggs to grade at about 24 ounces to the dozen that is as much as can be asked of her within reason; and, while a breeder might prefer larger eggs, he would not reject as a breeder a heavy layer that would do as well as that. But if a hen's eggs run quite regularly under 24 ounces to the dozen she should not be used to breed laying stock unless she is in every other respect an especially desirable hen for the purpose. In that case she should be used, but in a mating with a male of a line that produced large eggs.

Broadly speaking, hens lay eggs proportionate to their size, yet this is a general rule with so many exceptions that it has to be looked at pretty carefully before being given even with reservations. The size of the eggs of birds varies independently of variations in the size of the birds, and while it would not be possible for a small hen laying almost daily to lay very large eggs, it frequently happens that hens which lay large eggs lay quite regularly every other day, and so may make considerably better than ordinary production records in a year. Some strains of rather small hens lay much better than this and remarkably large eggs for their size, but in the writer's observation such stocks are peculiarly prone to the troubles which result from difficulty in laying. On the other hand, many large hens lay small eggs—eggs which seem abnormally small for the size of the bird. Most cases of this kind are in standard stocks that are bred for exhibition without attention to characteristics of the eggs produced and probably originate with a hen of remarkable exhibition quality that happened to lay a small egg and to transmit that character to her descendants.

The impression prevails quite widely among breeders that hens that lay small and poor-colored eggs transmit that character to their offspring much oftener than the hens that lay large fine eggs impress that upon their stock, but this is probably erroneous. The trouble is not with the hens and the laws of inheritance, but with the breeders, very few of whom are willing to select their eggs for hatching as carefully as is necessary for the first year or two to establish in a flock the character of laying eggs of good size, form and color. This applies generally to the majority of egg farmers as well as to breeders whose interests are not so closely involved. A large proportion of those who ought to be producing eggs that would run 26 to 28 ounces to the dozen and uniform in shape and color, and not over 10 or 15 per cent that would not grade as choice selected eggs, do not have 30 per cent of their eggs that will grade with their best.

In some of the agricultural colleges one piece of the laboratory apparatus is a grading board or table for eggs, used in demonstrating to the students what the producer loses by not properly sorting and grading his eggs before sending them to market. To grade closely an ordinary case of eggs as sent to market the board used for the purpose must have a large number of divisions. The average case of unassorted market eggs contains up to eight or ten grades and classes of eggs. These of course include collections from many flocks. But the average flock producing eggs for market is producing from four to six or more different grades when the eggs are properly graded, and this means that the average producer practically cannot grade his eggs for market because he has not enough of any one grade to make use of such packages as are used in wholesale trade.

The practical way to correct this condition is by breeding for one grade of eggs. The eggs cannot all be actually of one grade. There will always be some culls, but by breeding for one grade the culls will be reduced as much as possible. A poultryman who is producing eggs for market only and stock to breed layers of eggs for the market, ought to have his own standard size, shape and color of eggs, and never use an egg for hatching that does not closely approximate that standard. If he follows this policy he will in a few years have eggs so uniform that sorting and grading them for market will consist only in discarding an occasional small or misshapen or cracked egg. It does not, as a rule, make much difference what color or shade of color is selected. While certain markets have their color preferences, there is always sale at a premium for eggs of good size and quality and uniform color in most markets. If the breed kept lays white eggs selection for color is easier than in brown-egg breeds in which variations in color are more marked.

In general, there is no particular advantage from a sales standpoint in breeding for extremely white eggs or extremely dark brown eggs, for the market for such at better prices than ordinary whites and medium browns is limited to a very few localities and a small class of buyers. If a stock of hens lay mostly a slightly tinted egg—one that looks white until a white egg is placed beside it—it is better to select that tint as the standard than to undertake to get a whiter egg. In brown-egg flocks generally it is as well to select one of the darkest of the numerous shades of brown that are found in such flocks when there has been no selection for color. There are comparatively few cases in which this would result in the selection of a darker than medium brown—as that color is found in eggs. Breeding for extremely dark brown eggs is a fad well suited to the small poultry keeper who has the right kind of stock, but not generally advisable in commercial egg farming.

Special selection for shape of eggs need not be rigid when eggs are suitably selected for size. Beyond discarding those that are abnormally long or so large the other way that they do not fit the compartments of an ordinary egg case, or that have irregular shells, it is not usually good policy to go. Slight differences in shape are not as conspicuous as like degrees of difference in shade of color, and a too exacting selection on this point reduces the breeding stock available without giving any compensating benefit with much inbreeding.

CHAPTER IX

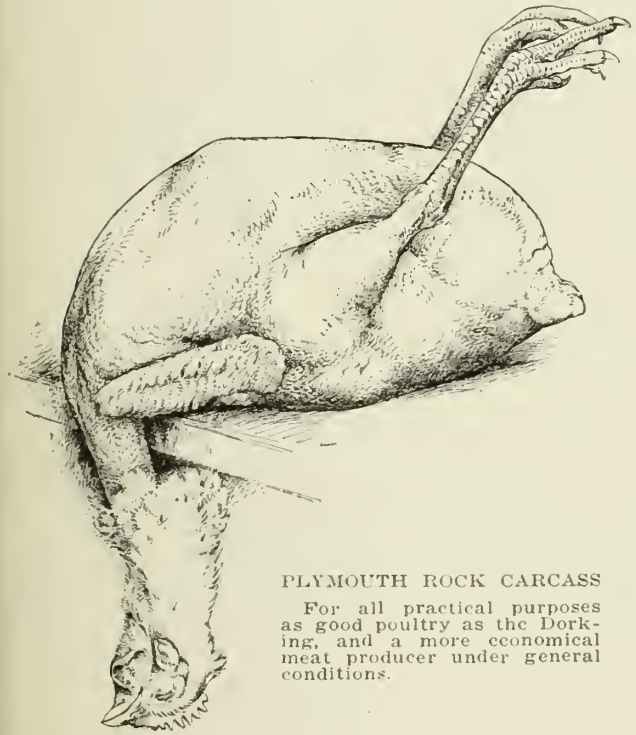
Breeding For Combined Meat and Egg Production

Adaptability of Dual-Purpose Types—The Combination Secured by Simultaneous Selection for Both Purposes—Grades of Table Quality Obtainable in Various Breed Types—Limitations on Laying Performances of Heavy Fowls Under Certain Conditions of Care and Management—Beneficial Effects of Minimum Standard Weight Requirements for the Light Breeds—Relation of Constitutional Vigor to Results and to the Preservation of Meritorious Lines.

Adaptability of Dual-Purpose Fowls

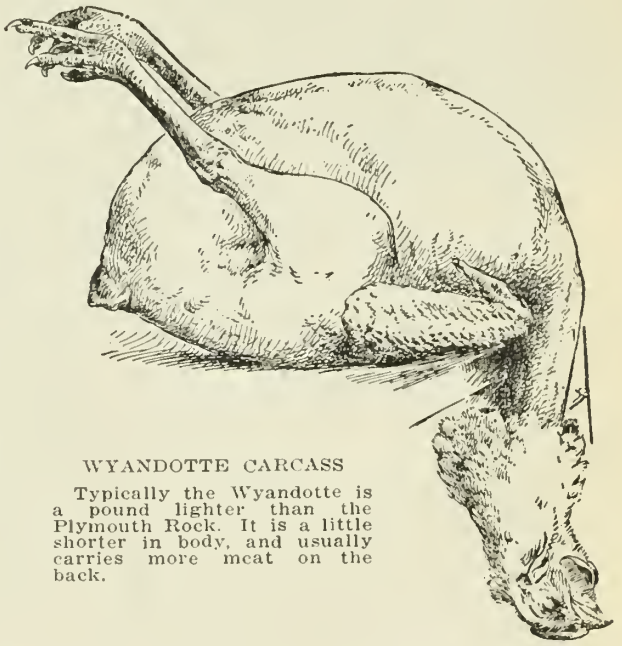
IN the discussion of breed shapes it was shown that the development of the general-purpose type and breeds was not merely because of the practical attitude of Americans in such matters, but was in line with the general requirements in improved poultry and the development made to meet them in earlier times in Europe, and that after the type had been popularized in newly improved forms here it came back into favor elsewhere. Probably 90 per cent of the poultry grown in America each year is grown by poultry keepers to whose interest it is to give equal attention to the production of eggs and meat. It is generally held that fine table quality and great laying capacity cannot be combined in the same fowl, or in the same breed or type of fowl. The idea is correct in one sense and as to many of the circumstances to which it applies, but is not to be accepted for all cases without reservations and important modifications.

If the development of a table type is carried as far as possible in all points that count in the making of a good table fowl, and in ease of finishing poultry for the table, the result is a fowl that is hard to keep in laying condition, yet if kept in such condition can be made to produce more eggs than the average "laying" type or strain fowl does under ordinary management. The difference is that ordinary management would not get eggs long from the table-type fowl. A fowl cannot have capacity for good growth without also having in it the possibilities of good laying, for—as was shown in the last chapter—every normal hen has the possibilities of heavy egg production, provided she has the digestive power and the constitution to stand rapid production for a long season. But a hen can be a phenomenal layer and very inferior in table quality—so much so that no process of feeding would make of her anything but an inferior quality of poultry. Neither the meat nor the capacity to produce meat is there.



PLYMOUTH ROCK CARCASS

For all practical purposes as good poultry as the Dorking, and a more economical meat producer under general conditions.



WYANDOTTE CARCASS

Typically the Wyandotte is a pound lighter than the Plymouth Rock. It is a little shorter in body, and usually carries more meat on the back.

In breeding for the combination of eggs and meat which most poultry keepers want, in a fowl adapted to general use, we cannot make the type one that gives perfection in fullness of form and fineness of bone; but we can make in almost any breed a type that is meaty and that is equal to any in fineness of grain of meat, and has enough of the tendency to put on fat to be easily fattened as much as is necessary for American markets. To all intents and purposes this type of fowl is as good a table fowl as the more highly finished (in shape) type. Its lack of finish as compared with a bird of finer form is not apparent except to a critical judge of table poultry. The only substantial difference between it and the perfect table form is that it has a little more bone and offal in proportion to the edible meat. The quality of its meat is just as good when birds of the two types are grown the same way. No matter what the natural quality of a bird may be it will not make good table poultry unless properly grown for that purpose.

Selection for Both Purposes Solves the Problem

To combine good egg production with the qualities of this type is simply a matter of breeding for both in

the same stock. It may be freely admitted that the combination is not a common one; but, as pointed out in the chapter on breeding for the table, the quality described is not common in table poultry either, and is lacking there because little attention has been given to breeding for it. The laying capacity which can be most easily bred in this type (with finest table quality and only a little lacking in table form) might be described as a first-class limited power to produce eggs. That is, capacity that

PAIR OF BARRED PLYMOUTH ROCK ROASTERS GROWN AT MASSACHUSETTS AGRICULTURAL COLLEGE
Weight, nine pounds apiece, dressed.

while the hen remains in laying condition, and is properly fed, will give as high egg production as is obtained in the best laying strains; but that will not, as a rule, maintain production at this rate for more than one season. The cause of this limitation of laying seems to be a complex cause, or a combination of several things of which sometimes one, sometimes another appears as the immediate and particular cause in a case. From the fact that hens of this type fatten readily on ordinary rations when not laying, it is commonly supposed that it is the accumulation of fat that makes them generally rather poor layers after the first season. This topic is fully considered in the author's book, "How to Feed Poultry," in this series, and the conclusion given as follows:

"While we may say that the accumulation of fat does not act as a direct preventive of egg production, there is no doubt that the accumulation of fat beyond the small reserve that is advantageous to the bird impairs its vitality and weakens every function. It is continued and progressive physical deterioration, and not the mechanical interference of fat that unfits overfat hens for egg production."

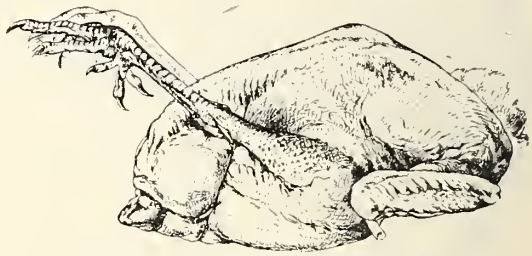
Broadly and briefly stated, the general reason why hens with good meat properties do not last as long on the average as those of inferior meat properties is that, from the time hens slack up laying as the molting season begins until the regular winter routine is established for the stock in winter quarters, old hens do not, as a rule, get the attention necessary to keep them in prime condition. Those in confinement are usually fed too highly in hot weather, when they cannot stand either the heat or the high feeding as well as hens with less flesh and a more active temperament.

Line Breeding for the Egg and Meat Combination

It is often found, however, that some hens that are well fleshed keep in laying condition and lay as well as lighter hens. These appear to be of a type that is exceptionally vigorous, and that is not inclined to put on fat under ordinary feeding until three or four years old, and that if not yarded too closely keeps in good condition and lays almost continuously. This type at its best is rare, but there are few breeders of long experience with medium and heavy breeds that have not repeatedly found it in hens good enough to be kept as breeders as long as they produced eggs. As stock is usually managed (few hens of these breeds being retained for more than two laying seasons) it is not observed, though it can hardly be doubted that many more hens have it than the occasional choice breeders in which it is oftenest discovered. There are, of course, all grades of this character as shown by the numbers of hens that under usual conditions lay longer than their companions.

But it is the hen that has the characteristics described in marked degree, that might be regarded as the perfection of the type, that is of interest to the breeder of poultry for both eggs and meat. If he can produce from her, first a line, and then a strain with this characteristic, he has practically a perfect combination of table and laying qualities. Such hens may not be invariably fine grained in flesh, but as far as the author's observation goes—and he has had quite a number of them, and has often had them pointed out to him in the yards of breeders—they show all the outward characteristics of fineness of skin, bone and flesh. His own stock of this character was generally fine grained.

While this type in its perfection is most desirable for breeding dual-purpose fowls, continuous selection of the hens that show most of its character will always improve the dual-purpose combination as found in average stocks, provided that due consideration is given to having hens in prime condition at the breeding season. The difficulty of this is one of the great stumbling blocks in the way of producing great layers from great layers.



CARCASS OF CROSSBRED DORKING-PLYMOUTH ROCK PULLET
Note the abundance of flesh, and the fineness of bone, as shown by the small thighs.

The greater proportion of hens that make records of over 200 eggs a year, where their pedigrees are known, come from hens that are nearer the 150-egg class in actual production, though of the same general line of breeding as the heavier layers. It was the regularity with which this was found to be the case that in earlier periods led most breeders who undertook to make 200-egg strains from 200-egg hens to discontinue the effort after two or three years. Evidently few hens that under favorable conditions or pressure of high feeding can

make extraordinary high records can at the same time produce daughters equal to them in vitality. That some can is apparent from the records of higher production—up in some cases to over 300.

Quality of Dual-Purpose Type Obtainable With Various Breed Types

The breeding of dual-purpose fowls is in the nature of the case a more complex and difficult problem than the breeding of fowls especially for meat or especially for eggs. Even considering that in each of these special lines some attention must be given to the characters belonging peculiarly to the other, the second quality is always subordinate, and is really taken into account only in so far as it in some way strengthens the first. Thus, to maintain fair capacity for egg production in a table fowl is necessary or the stock eventually runs out; while a fair amount of flesh makes a fowl of the laying type less susceptible to severe weather, gives it a little more reserve force, and as a result of this may give it more power to transmit its qualities.

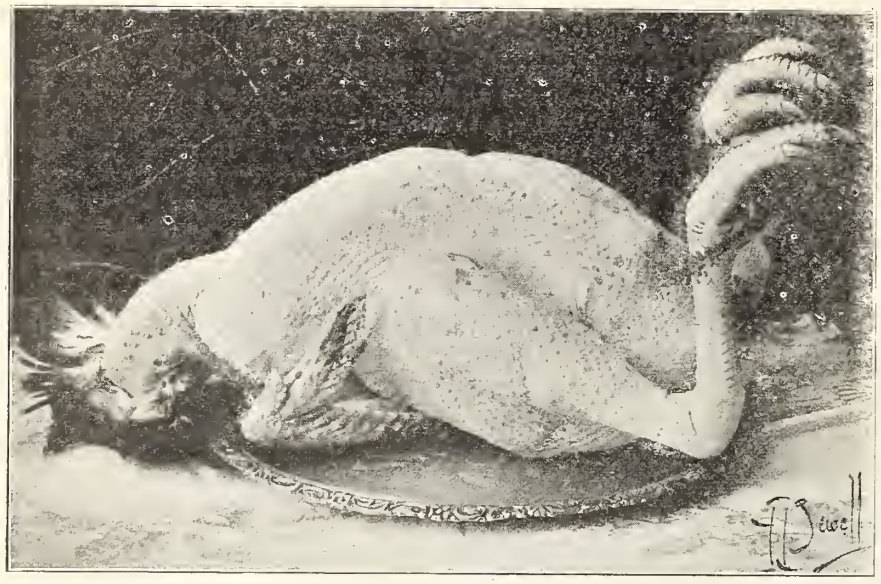
But to breed both qualities to the highest excellence that can reasonably be expected and maintained in each in conjunction calls for equally rigid selection for both, and greatly reduces the number of individuals available for breeding purposes. It means discarding for the purposes of this line of matings many specimens of much better than average quality, and some of extraordinary quality in one respect but very deficient in the other. The actual wastage in these rejections is not as great as the bald statement of the case seems to make it. To a breeder beginning systematic breeding for such a superior combination of quality, discarding defective birds for this purpose does not mean losing the use of them for whatever they are worth in his regular or ordinary matings.

FRONT AND SIDE VIEWS OF A PAIR OF WHITE PLYMOUTH ROCK ROASTERS

The smaller of these two birds, as seen in profile, shows a slightly protruding breast or front of keel bone. Aside from this these birds show fine form from either point of view. In selecting breeders, males with protruding breastbone should be discarded.

The point is simply that they are to be kept out of the line he is trying to make the foundation of a superior strain. The closer and more carefully he breeds this for the first few years the less culls he will have to discard when the stock is being produced in large numbers.

And with this rigid selection for both table and laying qualities there must also be some care in selection for standard type and for standard superficial points as well. A breeder who is producing superior stock of any kind ought not to be satisfied with a type of stock that is not so desirable to others that the breeding-quality birds that he does not need himself can be sold at good prices—at much better than market prices. This one cannot do to any extent and with permanent satisfaction to all concerned unless he breeds fowls that will pass as creditable representatives of the breeds whose names they bear. With a little publicity a breeder can for a time sell stock on any credible record of its quality and performance in a single line—as high egg production or remarkably good and quick growth. But no one in this country has ever built up an extensive and permanent trade on a strain of poultry that would not appear to the ordinary person—not overcritical of the lesser faults in standard poultry, but in a general way familiar with what the Standard required in a variety under consideration—to be of fair ordinary standard quality. Further, every breeder of standard poultry who has sold much of it knows that the buyer, who in pricing stock says that he does not care about "fancy" points, but wants stock of good practical merit, will find fault very vigorously with anything sent him that is deficient in any standard quality that he appreciates.

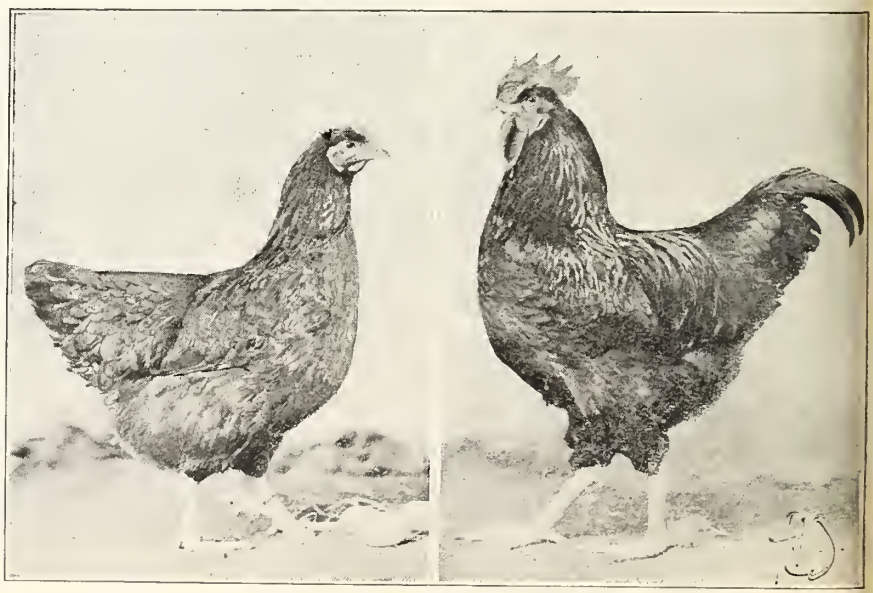


RED SUSSEX CARCASS

Of the dual-purpose or general-purpose breeds, the Plymouth Rock is the easiest to make a superior table fowl and superior layer while keeping close to standard type, for the type is an intermediate one, well suited to both meat and egg production. In the Wyandotte, breeding for blockiness in form, especially when this is exaggerated by shortening the neck and legs, and breeding for long, loose plumage, makes a fowl that is hard to keep in good laying condition. For a period, about 1910, such an extreme type was favored in the showroom with the result that Wyandottes—especially Whites—generally were bred much shorter on the leg than they had been, and reports of poor laying by Wyandottes were more numerous than ever in their history. At that time many of the hens were so short in leg and so long in feather that the outline of the thigh did not show at all. The writer has often measured with his fingers the space from the feathers to the floor as a Wyandotte hen stood in her coop at a show and found it less than 1½ inches.

The present standard model Wyandotte is about as low on the leg and as blocky as is consistent with continued good egg production with slightly skilled management. It should be noted, however, that the less blocky birds, which will usually be found a considerable proportion of a flock, are much easier to handle for egg production. The type can be slightly modified, but still be typically Wyandotte. A point to be noted in this connection is that exhibition Wyandottes often show better egg type at home than when in the showroom. Not only are the blockiest specimens preferred for exhibition, but the blocky effect is increased by washing and fluffing the feathers in preparing the birds for exhibition.

In the Rhode Island Red the general tendency is in the opposite direction. Selection to keep away from Plymouth Rock type mostly leads toward a rather attenuated type, though in some stocks the Wyandotte shape (somewhat too fine) is more prevalent. The Red that approaches either of the plumper types will be a better



PAIR OF RED SUSSEX FOWLS

table fowl than the narrower-bodied Red. Hence, if a breeder of Rhode Island Reds wants stock that will stand as well in the markets as the Plymouth Rock and Wyandotte types, he must go as far in the direction of one of those types as he can without getting distinctly away from Rhode Island Red lines. This can be done better in the approach to the Plymouth Rock type than in the approach to the Wyandotte type, and in a large bird than in a medium-sized or small one. As a matter of fact, some of the most popular exhibition stocks of Rhode Island Reds are better Plymouth Rock shape than many Plymouth Rocks, and their carcasses, when dressed and all parts that would identify their color removed, cannot be distinguished from those of Plymouth Rocks. Yet the birds in life would pass as good models of Rhode Island Red type, because with the aid of shorter, closer plumage and a different carriage of the body, balanced a little differently on the legs, the distinctive Rhode Island Red lines are well preserved, and the breeder has made at the same time Rhode Island Red type in his live poultry and Plymouth Rock type in his dressed poultry. The breeder of Rhode Island Reds who breeds for more meatiness in his stock should, however, bear in mind that in doing this he reduces the proportion of them that will keep in laying condition easier and longer than the average Plymouth Rock and Wyandotte.

WHITE PLYMOUTH ROCK CAPON
Illinois College of Agriculture.

In the Orpington the problem of combining meat and laying qualities is practically the same as in the Wyandotte except that the birds are larger. The standard type is a little heavier and shorter in the leg than is desirable in a model dual-purpose fowl, so to maintain the combination desired in characters affecting meat and egg production the breeder must carefully avoid going beyond the standard type in the points indicated. By making this the extreme in his flock he will have more active energetic birds than if the standard type is his medium type.

In the breeds classed as meat types, with the exception of the Langshan, the development of meat and laying qualities on a fairly equal footing depends quite as much on the way the birds are grown and handled as on the breeding. This is measurably true of the breeds in the general-purpose class that carry most flesh, but applies to the heaviest breeds in larger degree. To make a good layer of a meat type bird, particular attention must be given to having the frame well-knit so that the bird can handle itself as well as a smaller bird. To accomplish this the chickens when growing must not be crowded as much as is customary and must have good range. Lack of these advantages may be overcome by good care and management in some of the smaller breeds, but not in the larger ones. Unless one can give them the advantages they require for their best development he had much better keep one of the breeds of the dual-purpose class.

Nearly all Light Brahma stock that is "bred for eggs" or known as of better than ordinary laying capacity is distinctly off-type, almost invariably undersized and scrawny, with actually nothing of Brahma character but the pea comb and some feathering on the shanks and toes, and as inferior in color as it is in size and shape. Such stock is not bred for eggs in any proper sense of the use of the word BREED. It is simply in the state in which, with indifferent attention and skill, poultry keepers can most easily get fair egg yields from stock that has a strong tendency to fatten. The so-called laying strains of this kind are always very short lived. They come into prominence on the exploitation of unusually good performance for stock of a heavy breed under ordinary management. But few people who see them want them, and as a rule the progressive deterioration that brought them to the stage where the owner could do fair work with them almost immediately takes them below it, and no more is heard of them.

RHODE ISLAND RED CAPON
Illinois College of Agriculture.

There is no advantage in breeding Brahmas or any other large fowl for eggs unless both size and type are preserved; and both can be preserved and high production obtained. What can not be preserved in a heavy-feathered fowl, with foot feathering is good laying condition with the toe feathers in exhibition condition. The birds cannot be given the opportunity for exercise needed to keep them in laying condition—especially in winter—without breaking the feathers of the feet to an extent that may not be noticeable in the yards but is very conspicuous when they are in an exhibition coop. Every other characteristic of Brahma type can be retained in full with good egg production by simply selecting the good layers that have nearly correct type and that keep in laying condition longest. The Standard model Light Brahma female shows a hen that is very much of the desired type. She appears a little too short in the leg as she stands, but allowing for a little relaxation of carriage of the bird in repose, and for the smoothness of plumage in a bird posed for the camera, the type is entirely consistent with high production. Such a hen in life, in condition and in action, would appear to be a little longer in the leg with less depth of breast.

The greatest stumbling block in the way of most breeders who try to get good-laying quality in a typical Brahma is coarseness all through the type. Exaggeration of the standard requirements for breadth of skull, with

"crown projecting well over eyes" is common. In moderate form this character adds much to the beauty of the head of a Brahma, and to the whole appearance of the bird, but carried to the extreme sometimes seen it is not attractive, and is usually correlated with coarseness of bone all through.

In breeding Langshans for meat and eggs the fault to avoid lies in the opposite direction. The tendency, even in this country where the extreme giraffe-like type of Langshan is not in favor, is to more length of leg and neck than is desirable in good table form, or consistent with the greatest strength and vigor. The medium type of Langshan which has always been most popular here is an excellent dual-purpose fowl. The color of the legs limits the outlet for it as table poultry, but for home use or for trade direct with consumers a Langshan of fine quality and type is not surpassed as meat. If extremely dark brown eggs are desired the Langshan egg surpasses all others, and the most desirable table form of the breed (preserving type character) is as easy to keep in laying condition as the easiest of the general-purpose class.

Effect of Minimum Weight Standard Requirements

The entire aspect of the question of combining table quality with high egg-producing quality in the so-called laying type was changed when the American Poultry Association prescribed standard weights for Leghorns and Anconas. This action was in effect formal renunciation of the long-prevalent idea that "weight" is of no consequence in an "egg breed." True, the Standard had long had weight requirements for the larger breeds of this class, but that had been a necessity to maintain some breed distinction between them and the smaller ones when the types were not as far separated as they have been in recent years. The orthodox view for a long time was that weight was not a consideration in laying type, or—at least—not a primary consideration. What changed this view, and led to the fixing of standard weights for Leghorns and Anconas at 5½ lbs. for cock, 4½ lbs. for cockerel, 4 lbs. for hen and 3½ lbs. for pullet, was the fact that whenever a lightweight variety becomes popular for egg production the general stock of that variety after a time deteriorates so much in size, and lays such small eggs that the reputation of the variety suffers, and the business of breeders of standard stock of the variety is proportionately diminished.

In the history of Leghorns in America this was shown on a large scale twice—first in the Brown Leghorn, then in the White. Prior to about 1900 the Brown Leghorn was far more popular as a layer than the White. Considering the relative numbers of people interested in poultry of distinct types in the earlier and later periods, the Brown Leghorn was probably more popular than the White is now. But in the 'nineties the popular Brown Leghorns were generally very small and layers of small eggs, while the comparatively scarce White Leghorns averaged much better in size (many of them being a pound or more above the weights the Standard now requires), and White Leghorns generally laid eggs of good size.

The difference in the size of the eggs had much more to do with the decline of the general popularity of the Brown Leghorn than the difficulties of breeding it for exhibition purposes which have been widely blamed for that result. The Brown Leghorn went out as the popular representative of the "egg type," and the White Leghorn came in. For a time the size of the hens and of the eggs was fairly well maintained, but in time—as was inevitable—both deteriorated, and this tendency to decrease of size and of consequent value for egg production was helped along by the popularity of a refined and dainty type of exhibition White Leghorns. Together these influences brought Leghorns down in size so much that there were more hens that at maturity weighed less than three pounds than could be found above that weight, and in almost any large stock of ordinary Leghorns kept for layers many hens of two pounds and under could be found. It is this condition of the Leghorn stock of the country that has created among handlers of market poultry a strong prejudice against Leghorns.

Breeding to a size in which only a small proportion of the individuals in a flock make standard weight when in breeding and laying condition is not breeding to standard weight. To keep the standard weight as the average in a flock at maturity it is necessary to have about half the stock run overweight at maturity and to have at least ten to fifteen per cent of these go about a pound overweight. That means, in Leghorns, a few cocks up to 6½ lbs., and a few hens up to 5 lbs. For eggs and meat these larger birds are just as good as those of standard weight, but the limit on weight is a requirement necessary to preserve as much of the fineness of the exhibition type in a good substantial commercial fowl.

Within the range of weights that can be used in breeding Leghorns of this class—from the weights for cockerel and pullet to a pound above the weights for cock and hen—birds of fair standard Leghorn shape will be good table poultry for all purposes to which their size adapts them; and will be high producers of good-sized eggs under any conditions and management at all conducive to good production. Up to a pound and a half weight they will grow as fast as the average chickens of the medium and large breeds, and will make nicer looking broilers than most breeds when dressed at that age. Some of the larger cockerels may be held a little longer, but in general it will not pay to put a commercial product of Leghorn cockerels in competition with the other breeds at much over two-pound weight. For home use the cockerels will make good to fair-quality poultry until four or five months of age. Hens of the type described, if they have been fed through life as they must be to keep them producing profitably, will sell as well in the general market as hens of any breed, for though they may not be as tender as the average medium to large hen of the larger breeds, they will be just as tender as, and generally smoother, better looking poultry than the general market receipts of hens of their size and weight, which are made up of mongrels and of the undersized, poorly grown and ill-conditioned specimens of the larger breeds.

What has been said of breeding Leghorns for eggs and meat will apply generally to all breeds of the "laying type." In the larger breeds of this class, reduction in size can take place without making the birds so small, and the more limited numbers of these breeds, and the consequent indifference of the markets to their faults as market poultry saves them from being discriminated against as the Leghorns have been. But in all of them, Minorcas, Andalusians, Campines, and also in the less popular Hamburgs and Polish, a little more attention to practical values in both eggs and meat, and to the constitutional vigor which is the real foundation of those values, will make poultry that is more serviceable to its owners and more attractive to others.

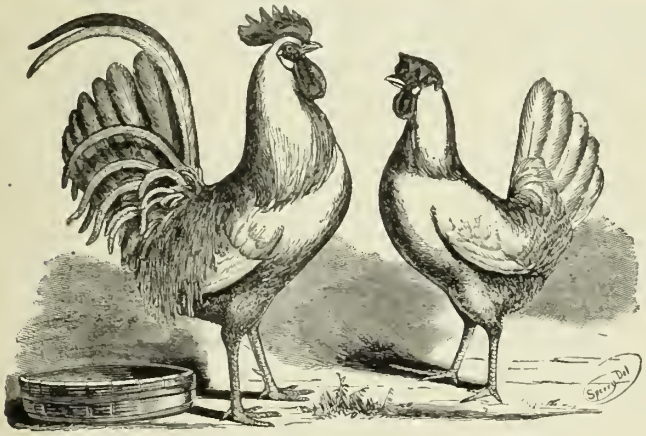
CHAPTER X

Principles and Methods of Making Poultry Standards

Poultry Standards Originated in England—Greatly Improved and Established on Broader Lines in America—Features of American Standard Making—Particular Attention Given to the Development of Superior Types, and Special Care to Practical Qualities—Exaggerated Types Appear Only When Popular Interest in the Breed Lapses—Ideals of Perfection Result From True Appreciation of Breed Character, Not as Something fixed in the Past, but in Its Possibilities in the Hands of Skilled Breeders.

PRINCIPLES OF STANDARD MAKING

AT many points throughout the preceding chapters reference has been made to requirements and objects of the standards as adopted by the American Poultry Association. Particular emphasis has been placed upon the fact that a reasonable interpretation



WHITE LEGHORNS OF THE SEVENTIES
This shows the style of bird in favor at the time the American Poultry Association was organized.

of standard requirements will in most cases secure the development of standard exhibition types that are good utility types. It has also been indicated in many connections that the purpose of the Standard is to establish distinctive character in breeds and varieties and to secure uniformity in each. Before going further in the discussion of the principles of breeding it is desirable to consider more systematically and fully the principles which have guided in the making of the Standard. These will be better understood if a short account of the origin of the Standard of Perfection is given first.

Origin of Poultry Standards in England

For more than twenty years after the first poultry exhibitions were held every breeder and judge followed his own ideas as to what poultry of any named breed or variety should be. It was customary in the early exhibitions for two or three judges to judge a class together, the standard applied in that case being such a composite of the ideas of the judges as could be agreed upon. It might fairly represent the consensus of their opinions, or one man might dominate the judging committee; or, in give-and-take in the settlement of disputed points, mutual concessions to give one judge his way on one point because another judge had his way on another point might give very inconsistent results.

To remedy this unsatisfactory state of affairs breeders and judges got together to make written standards which all would accept as authoritative. The first of these standards were made by the Poultry Club of England (not the present body of that name) about 1865 or 1866. The date is uncertain. Mr. Lewis Wright, in "The Poultry Book" says the club was organized "about 1865," that it lasted but a short time, but in that time produced and published the first "Standard of Excellence." Mr. Harrison Weir, in his "The Poultry Book," published in 1867, gives these standards in full, and adds standards for the French breeds. From this it would appear that the first standards were made not earlier than 1865 or later than 1867.

Improving Standards in America

Two versions of the English Poultry Club's "Standard of Excellence" were made by individuals and printed in America. The inconsistencies in these, and the variance of both in some respects with American ideas, led to the organization of the American Poultry Association with the primary object, single control and systematic improvement of the standards. The English "Standard of Excellence" was used as the basis of the work, but modified in various respects, and the title used was "The American Standard of Excellence." This book was first published in 1874. Besides some changes in specifications to suit American views, the descriptions were framed more for the purpose of putting emphasis on principal characteristics—the minor characters being presented as details of the important sections. Thus in

MODERN STANDARD WHITE LEGHORNS
Comparison of these birds with the pair above shows more plainly than words the results of concert of effort by breeders to standardize the finest ideals and secure the perfection of finish in every character. The same thing could be shown by similar illustrations in many other breeds and varieties.

the English Standard the description of a bird began with the beak, comb and other head appendages, and the head proper was described last; while in the American Standard the first point was to describe the head of a bird of any breed in terms that would at the same time bring out the typical appearance of the head with its appendages and the important details of the head proper.

Another marked difference was the substitution for the English scale of 15 points of excellence of a scale of 100 points, in which 100 was regarded as representing the ideal perfect bird of its type, and instead of adding points of merit in a few large sections the value of a bird was arrived at by deducting the estimated values of its faults from 100—the numerical symbol of a perfect specimen. This feature though it has in some ways been misunderstood, and often misapplied, has had a great influence on the development of types in America. By making the numerical values assigned to sections large enough to admit of cutting on a scale of from ½ to 1½ points for the ordinary degrees of faults found, and still leave a score that fairly expressed the relative value of a specimen as compared with one considered perfect, it was assured that birds would be carefully examined in every section and due account taken of all the minor faults. The primary object of the careful division of the characters of a bird into sections to each of which a definite (and relatively large) numerical value is given, is to insure equal consideration to all sections, and a perfectly balanced and highly finished type. The result has been that while in a few varieties English standard fowls excel American standard exhibition fowls in particular points, neither type nor the details of common and only moderately conspicuous characters are as highly finished in the popular breeds generally in England as in America.

American Standards Combine Utility and Beauty

While giving this attention to the details of finish in type, the framers of the American Standard did not overlook nor neglect practical qualities. A comparison of these early Standards will show that at many points where the English Standard had no specification, or had one not consistent with the practical use of the bird, the American Standard makers introduced a requirement designed to give a character its best practical form in accordance with its economic position and uses here. It would have been strange had the Standard makers taken any other attitude in such matters for at that time the Brahmas and Cochins were at the height of their popularity as practical table fowls of good egg-producing capacity, the Leghorns were rapidly making their reputation as superior egg producers with ordinary care and management, and the Plymouth Rocks were well started on the way to the most remarkable boom any breed had ever had. All these breeds were equally popular in the exhibition room and on the farms and in the poultry yards of the country. In fact, there never had been before that, nor has there ever been since, a case of a breed attaining any measure of popularity in America except on the basis of practical values.

All of the breeds once popular, but now rare and regarded as purely of interest to fanciers, were exploited first for their utility values. Only bantams and a few other abnormal breeds were accepted primarily for their beauty or oddity. The Spanish, Polish and Hamburgs were the common great layers until the more rugged and hardy Leghorn displaced them. The early Brahmas and Cochins were hardly heavier feathered than the Langshans are now. The early Spanish had very moderately developed faces, the Polish, crests that did not seriously interfere with their use as family fowls. All this the makers of the American Standard knew and appreciated, and they realized fully the service of the fancier-breeder in improving the poultry of the land, and the importance to the commercial breeder of preserving types that were desirable for the production of meat and eggs, and much better for those purposes than the common stock.

All the extreme developments that now are actually detrimental to the practical uses of the breeds that have them, came long after this time, and after the general poultry public had forsaken the breeds for the new ones that suited them better. As far as America is concerned it is erroneous to say that these breeds were spoiled for practical use by the fanciers breeding particular characters to extremes. The fanciers rarely, if ever go to extremes in such matters until the practical poultry keepers have altogether forsaken them. Then, as a rule, all but a few of the breeders of exhibition stock go into some breed that is popular. The few that are left are those who like the extreme type of the breed and are now free to carry its development to the limit.

A little familiarity with the periodic poultry literature of the 'seventies and 'eighties will show that the idea prevailed at that time that peculiarities of breed form were in some way associated with performance and that the standard type of a breed should be the type in which that breed was most efficient and productive. It is not easy to explain clearly the views of those who held this, for their ideas were hazy and not at all in accord with facts. But the point that interests us here is that the Standard makers, generally, both in that period and afterward, as long as there was general interest in a breed, have taken the position that to the best of their understanding they would make the Standard describe the most useful type of the breed.

Standard of Excellence Becomes Standard of Perfection

In the 1888 edition the title of the Standard was changed to "The American Standard of Perfection." The change expressed an attitude toward ideals in poultry breeding which was slightly indicated in the making of the first American Standards, and which had been steadily developing. However incompatible it now appears with the things we know and that the breeders of the olden time could see when they opened their eyes, the prevailing idea of a breed was of an original pure creation which had become more or less mixed with foreign blood, and which when in this state was capable of being purified of its various taints by careful selective breeding until the original type was restored. The common idea of this original type was not of a highly finished type, but of a distinctive type free from foreign characters. The American breeders, judges and standard makers saw more and more as they worked to harmonize their ideas of what the various breeds should be that their real standard was not in the past form of a breed, or in any natural combination of its characteristics, but in the imagination of the fancier who could visualize a specimen having in symmetrical, harmonious combination all the good and beautiful points of form and color appearing in any individual of the race.

Their idea was perfection in every part and detail. The declaration that the object of the American Poultry Association should "always be for the perfection of the

American Standard of Perfection" had two meanings. It referred both to improving the form and language and other features of the book, and to progress in ideals. It was never assumed by any body of men at work upon the making or revision of standards that the ideal as then expressed could not be improved. On the contrary, the constitution of the American Poultry Association expressly required that every standard should be open to reconsideration once in five years. This was done not simply to provide for possible changes in prevailing ideals, but because it was regarded as a practical necessity to sometimes make the standard ideal less finished than that which existed in the minds of leading breeders, and its specifications less rigid, because as a matter of policy in maintaining the popularity of a breed while bringing it from a relatively low level of excellence to a high one it is not desirable to have the specifications too

STANDARD REVISION COMMITTEE OF THE AMERICAN POULTRY ASSOCIATION AND ARTISTS DISCUSSING THE ILLUSTRATIONS FOR THE STANDARD OF PERFECTION

far in advance of the best birds produced. This provision for frequent revision of the Standard has had some undesirable consequences, and the period between revisions has been extended to eight years. The principle, however, remains the same. The purpose of the Standard is to secure a reasonable stability in ideals that have once been agreed upon, but not to impose the ideals of one period upon another.

Originally, and until very recently, it was the avowed policy of the American Poultry Association to discourage as much as possible the making of new breeds and varieties. As it relates to breeds this policy is plainly necessary. particularly so where the disposition to make new breeds is manifested mostly in making slight variations from recognized breed types. No argument is needed to show anyone who sees the closeness of breed type in the breeds we now have that there is little room for distinct new types that are not distinguished by some unusual superficial feature. But in regard to varieties and subvarieties the limitations are less plain. There is in the nature of the case no reason why good varieties and subvarieties should not be greatly increased in number, provided enough good breeders are interested in them to develop them to such a stage as the Standard requires in new breeds or varieties.

These requirements are really not onerous. It is only required that fifty per cent of the stock breed reasonably true to the standard selected. But most of those who make the new varieties that are rejected are not skillful breeders, or else offer their varieties prematurely, when they are in a stage at which only a most partial judgment could accept them as producing more than an occasional specimen reasonably true to the type described. In the early days of the development of the American class of general-purpose breeds and varieties there was apparently a good deal of opposition to new breeds and varieties from breeders of the recognized varieties who feared the competition of the new breeds and varieties. In no case could such opposition long postpone recognition of a worthy breed or variety, and it cannot fairly be charged that at any time since 1890 such opposition has been a positive factor in preventing a recognition of a breed or variety really entitled to it.

With regard to specifications for the same color pattern in different breeds the Standard makers have generally insisted upon a uniformity in color descriptions of all varieties of the same pattern which is not consistent with the frequent instances in which different varieties of the same breed are given different weights. The latter course is not defensible—no more so than a difference in description of shape. It is in every case a concession to the breeders of a variety that was not of the size and stamina of the other varieties of the same breed: that would not be made so if allowed a lighter weight; but that would have been quickly brought up to size had the Standard insisted on it. In the case of color, however, there has generally been insistence upon identical requirements for Partridge Cochins and Golden Penciled Wyandottes, or for Light Brahmas, Columbian Wyan-

dottes and Plymouth Rocks, for one shade of buff in all buff varieties, etc., etc. The ulterior reason for uniformity in such requirements is the convenience of the judges and their protection from the errors which they easily make where there are slight differences in the requirements for similar color patterns in different breeds.

As a rule, the majority of those engaged in making and revising the Standard have been judges—a considerable proportion of them not distinguished as breeders of any particular breed—and so the tendency has been to uniformity everywhere. The greater the uniformity the easier the work of the judges. In systematically working for such uniformity, even in cases where it was not logically demanded, they have simply looked after their own interests. At the same time it should be said that in doing this they have not been accustomed to go contrary to the expressed wishes of breeders representing any organized opinion who have taken the position that the breeders of similar varieties in different breeds were not bound to agree upon a common description, but each group should be allowed to follow its own preferences.

This explains various apparent inconsistencies in Standard descriptions. The judges—especially the general judges—want the Standard as simple and systematic as possible. The breeders of a variety want the specifications for their variety to suit their ideas of what is most beautiful or most appropriate. Where the breeders' interest is adequately represented, either upon a standard committee or at an association meeting where action is taken upon a proposed revision, the breeders usually either secure a description for all similar varieties that suits them; or have their variety described as they wish it; otherwise the association almost invariably makes all descriptions of similar varieties conform.

No feature of Standard making has been the subject of so much controversy as its systematic disqualifications for trivial defects. Without undertaking to go into the merits of the case as it applies to any particular disqualification or disqualifications, it may be said here that the principle involved is one of discrimination between faults that may be tolerated in an exhibition specimen and those that ought not to be, and though rigid application of disqualifications sometimes seems harsh, it is in line with the general insistence upon attention to detail that has given American standard poultry the finish in every character that well-bred stock show. Also, as was pointed out in an earlier chapter, the disqualification of a bird for exhibition does not prevent making proper use of it for breeding purposes. An extreme position upon some such points is not inappropriately termed a case of an institution having "the defects of its qualities." The first purpose of standards is to secure uniformity in the individuals of the same breeds and varieties. Uniformity and distinctive character are the motives of the Standard, and it is therefore not surprising that Standard makers sometimes make a little fetich of a particular detail.

It may be observed in a comparison of the characters of different breeds that, with occasional exceptions, the Standard calls for definite color markings sharply defined, in parti-colored birds, and for absolute uniformity of color in self-colored birds. In the course of progress in making breeds and varieties, and the standards for them, an indefinite marking will almost inevitably either be changed to a definite pattern or be gradually eliminated. Whichever is done, such modifications in other characters as are most in harmony with the change will be made. Two opposite cases of this character are the development of the saddle markings in Light Brahma males and the elimination of the hackle markings in Rhode Island Red males. Thirty years ago the Light Brahma male was required to have a white saddle, but a little ticking was tolerated. Now the Standard describes a definite form of striping for the saddle. When Rhode Island Reds first came into general popularity many of the males had a great deal of ticking in the neck hackle and some were lightly striped. Black has been entirely eliminated from the neck of the male, but a slight ticking is still tolerated in the neck of the female.

SIGNING THE CONTRACT FOR THE FIRST ILLUSTRATED STANDARD (1905)

A momentous event in the history of the American Poultry Association and of progress in breeding high-class exhibition poultry. The publication of ideal illustrations of birds in profile did more than anything else could do to educate poultry keepers to appreciation of correct types and the distinctions in types. In the picture from left to right are: J. H. Drevenstedt; T. E. Orr, Secretary of the Association; Grant M. Curtis; the representative of Gies & Co., publishers; F. L. Kimmey, Chairman of Revision Committee, and his grandson; D. Lincoln Orr, President of the Association.

CHAPTER XI

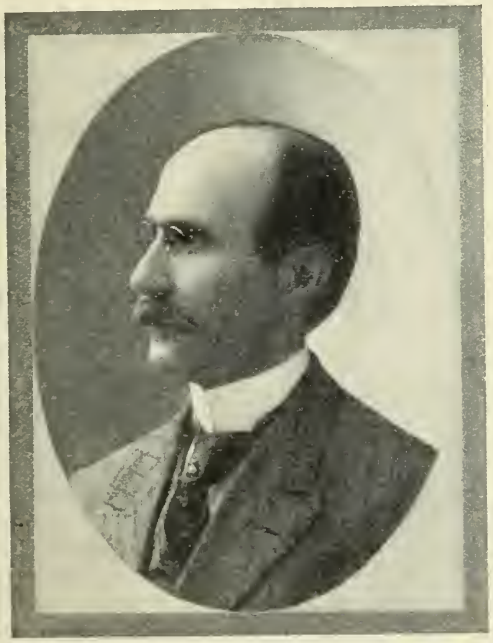
Systematic Mating of Fowls For Definite Results

Time as a Factor in Breeding Operations—Application of the Compensation Principle in Mating — Masculine and Feminine Features in Types—Relative Values of Appearance and Pedigree in Working Toward Advanced Standards—Advantages of Especially Severe Selection of Males—Discussion in Detail of Methods of Mating to Produce the Highest Standard Quality in All Established Colors and Color Patterns, With Special Consideration of Peculiar Difficulties Wherever Such Exist.

Time Requirements for Good Work

THE practical application of the principles of breeding where many characters are to be considered and a high degree of excellence is desired is a matter of systematic and painstaking observation of all the birds available—of not only considering the possible and probable results of every mating regarded as likely to produce stock of the type desired or that will make improvement in the direction of that type, but of actually penning the birds considered for each mating together, and perhaps making a great many different tentative matings before the breeder has fully satisfied himself that he has done his part as well as he can, and is willing to take the chances in the operations of the laws of heredity in his stock as mated.

The mating of a large number of breeding pens is a time-consuming job, involving continued close concentration of the mind upon the characteristics and the relations of a large number of individuals and a great many characters. It is a matter not of hours or days, but of weeks in which every available hour is given to the actual work, while the breeder carries in his mind the image of every pen he has mated and of every individual of special excellence that he has not yet placed. It is work that has a fascination for all who have in them any of the instincts of the breeder of improved stocks, but nevertheless it is hard work mentally, and sometimes also physically, and the breeder feels relieved when it is finished. Even where the entire breeding stock consists of only a few dozen birds, no off-hand work is permissible if all birds are to be used to the best advantage. The actual time spent making matings will of course be much shorter, but as a rule their details will be more or less under consideration for many days, and some matings may be changed several times before the breeder is satisfied with them.



WORLD'S FOREMOST POULTRY BREEDER

Mr. E. B. Thompson's standing as a breeder and exhibitor of Barred Plymouth Rocks justifies the above designation. What he has accomplished has been done by holding fast to fine ideals and steadily applying himself to the problems of breeding for perfection in the individual bird and uniformity in the flock. His achievements in recent years have been sensational, but the results were gained not by sensational methods, but by the most painstaking care in studying his birds and testing their breeding capacity.

In the discussion of methods of mating in this chapter the author assumes that those who use its information want to breed good stock, and to have as small a proportion as possible of chickens that, if unsuitable for their particular purpose, will not be good for some other purpose. The methods here given are those which give first of all a strong foundation of useful qualities, and on this any desired degree of beauty and exhibition quality. This is the only safe and economical way to build up a stock. To work for fine superficial qualities without constitution, vigor, and the size and type suitable to the breed is largely labor lost.

Equipment for Mating Fowls

The first step in the systematic mating of fowls is to have several adjacent pens used for breeding pens empty, and the birds to be mated (or those to be handled the first day at the work) in pens or coops close at hand. It is a good practice and one that greatly facilitates the work—which falls in the short winter days when the light is often poor — to weigh all the birds of the lots to be drawn from the night before, examining the birds as weighed for deformities or conspicuous faults in color.

Considering Size and Weight

If the standard weight, with the birds in good breeding condition, is to be maintained in a flock it is necessary to discard as breeders nearly all birds that will not come close to standard weight for cock or hen at the beginning of the breeding season—say two months before the date at which it is expected to have the first chickens from the mating hatch. Most breeders do not mate earlier than this, many are later. When matings are made early in the winter due allowance may be made for birds that are then not up to adult weights. Also at later times proper allowance should be made for the birds that are underweight because a little thin in flesh, and that will come up to weight quickly under the more favorable conditions of life which selected breeding stock generally have. Young males are often underweight and in rather poor condition because they have been bullied and cowed by others in the lot of cockerels in which they were. Many such males are naturally timid and on that account not desirable as breeders. But there are often males that were cowed by the concert of others picking on them, or by a male that matured more quickly, and, having taken the upper hand early in life, was able to keep it. Not infrequently such a male with plenty of natural pep and courage, if taken away from the flock that worried him, fed up and given an opportunity to develop confi-

dence in himself, will master any of the old lot in short order any time thereafter that he may come in contact with them.

Where it is known that some unfavorable condition during the growing season is responsible for the birds of certain broods, or birds hatched at a certain time, being somewhat under normal size and weight, due allowance should be made, for such birds will usually give their offspring not their own size, but that of their brothers and sisters that grew normally. A little concession in weight may also be made to birds that are normally underweight and uncommonly good in some important character, and especially to those that are strong and fine in bone, for such birds are needed to mate with those of the opposite sex that run above standard weight with a tendency to coarseness. The allowance for weight to a bird in condition must, however, be relatively small, for the more weight allowed such a bird in breeding, the more additional weight we must have in its mate, and the farther apart the parents are in weight, the greater will be the range of weights in their offspring. When stock is weighed and culled for pronounced faults in advance, it is a good plan to put all the underweight specimens in coops separate from the others, and in making matings to draw on these only when like birds of full weight are not found, or when a slightly undersized bird is appropriate for a particular mating. Other things being equal the bird of standard weight or a little over should be first choice.

When a bird in breeding condition runs much over standard weight its use as a breeder should depend upon merit in other qualities. Such birds are apt to be rather coarse of their type, but they are not invariably so. Large females are usually more desirable as breeders than large males—especially in the large breeds—for if large birds are mated to standard or large birds the size may be increased more than is desirable, while mating large males to small females is not commonly good practice for the males are apt to break down the females, many of which avoid the male as far as possible, and the fertility of the eggs is usually much lower than from any other combination of sizes. Large females with a male slightly underweight will generally give good fertility and throw chickens of good size and very uniform in size.

How far it is advisable to go above or below weight in selecting breeding birds depends upon the main object in breeding. If the object is to produce standard exhibition and breeding stock the margin either way should not be wide and a little more latitude may be allowed above than below the standard because stock generally tends to go down in weight unless selection prevents it. Opinions differ on such points, but it is probably a fair estimate of the practice of breeders who keep their stock close to standard weight, size and type, to say that they are willing to go about 10 per cent either way, rather less below weight, provided a specimen is remarkably good in other ways, and is properly mated to offset its lack of weight or excess of weight, as the case may be. This works better when applied to the medium-sized and small breeds than when applied to the large ones. They cannot be allowed as much underweight without losing type, and only the most careful selection for fine bone and vigor will keep Asiatic stock from becoming coarse if males over standard weight for cocks are used.

The "Compensation" Principle in Breeding

In a mating, the balancing of the qualities or the degrees of excellence or of fault in the characters of the sexes, is done on the general principle that the result in most cases is a blend of characters—that, as a rule, weakness in any point in one sex will be counteracted by a like degree of strength in the same character in the other sex. The principle fails sometimes at particular points because one side of the mating is prepotent over the other, but on the whole the characters either blend or are kept from going beyond the form in which they are in the parents. Thus in mating a male a pound over standard weight and a female a pound underweight we might get most of the offspring nearly intermediate between the parents, or offspring of all weights between those of the parents, but would not be at all likely to get any normal offspring smaller than the dam or larger than the sire, unless a possible influence of a grandsire or granddam could give that result, and then it would hardly occur except in a very small number of the offspring. In breeding for standard weights and sizes the working of the compensation principle is so clearly apparent in the great majority of cases, and the effects of disregarding it develop so quickly, that experienced breeders prefer matings as close to standard weights as possible. And when they must use a bird off weight in either direction they equalize matters by mating it with one of such weight that the average of the two is the average of the weights of a standard male and female of the breed.

This compensation principle is applied to every character for the purpose of keeping the combination of characters in the condition of equilibrium fixed by the Standard. In stock that is well bred most of the individual variations are slight and when they take an undesirable direction are immediately offset by combination with an opposite degree of variation, or sometimes simply by mating with a bird which has the standard form of the character and is known to be of a line that prepotently transmits that character in its desired form.

Selection for Type

Actual selection of birds for mating begins with the selection of the best and most typical bird among those under consideration, and the finding of the bird of the opposite sex which when bred with it will best reproduce both the general type and all the details of character. With breeders of little or of limited experience this best bird is likely to be the male that to them is most attractive. Older breeders usually work first along their established lines, making new departures only as an inspiration may seize them when handling the birds, or after the old-line matings have all been satisfactorily worked out. In old times, before the day of illustrated Standards and of the liberal use of photographic reproductions of the best specimens in the poultry press and in breeders' literature, novices often had crude and faulty ideas of type, but now most of those who have tried to learn anything about type have at least fairly accurate perceptions of the general features of the correct type in the breed in which they are interested. So the favorite bird will almost invariably be the all-round best bird they have.

The first thing to do with this bird is to look it over carefully for faults. That may have been done before, but it is a good idea to go over the bird again with the mind fixed especially on his qualifications as a breeder, and to get fresh impressions of every section, observing as one goes where a little weakness in the mate can be tolerated and where strength must be demanded. A veteran who knows his breed and the Stand-

ard by heart may work without reference to the book. One who is not sure of his familiarity with standard requirements in all their bearings will be wise to have the book at hand and verify all his judgments. The extent to which the compensation principle must be applied will depend upon how near the stock is in each particular to standard requirements. Compensation does not primarily apply to the relative strength and weakness of characters as between birds, but to their characters as compared with the Standard's requirements. If one's birds are all below standard in some particular he must mate the strongest in that point that he has—working to intensify the character, not to hold it in equilibrium. If they are all too strong in a character he must for a time use the weakest in that character.

For the male of best type the female of apparent best type should first be considered. If she has no characteristic noted at sight that seems to make her an undesirable mate for this male she should be placed on the floor of a pen with him, and the breeder should compare the two birds carefully from every angle, making them shift and change positions and stand in different lights so that he can detect any jarring differences of type or any resemblances in their lines which would be likely to be exaggerated in their offspring. The birds should be considered as they stand, section by section, for all that can be seen without handling the hen; then—if she passes muster so far—she should be taken in hand and carefully looked over for faults, especially for the faults present in the male. Also if faults not noted in the male are found in the hen, he should be examined again in the same characters to make sure that all possibilities of intensification of faults in their progeny have been duly considered.

It is seldom that ideal mates are found. There are too many variable characters to take into account for that. The breeder's job is to make sure that he mates his birds as well as they can be mated on their appearance and upon what he knows of their qualities as table fowls, their capacity as layers, and their breeding tendencies from the Standard viewpoint. If he is more interested in meat or egg production than in standard quality he can consider the type of the specimens before him with reference to the relation of type to those qualities, mating for a full-formed type for table poultry and for a rather spare one for egg production, yet keeping within a reasonable interpretation of the specifications of the Standard. Also, if he is most interested in one of the lines of production he can be more lenient with faults in color or in superficial characters, but even so it is to his interest in the long run to breed to a fair degree of standard quality. If the first hen selected seems for any reason undesirable for this mating, the search must be continued until the breeder thinks he has found a hen that will suit.

The next step is to find how many more hens he has that are near duplicates of the one selected. In ordinary stocks this is very difficult to do. It is only in the offspring of highly prepotent birds and in lines of high quality, that hens can be found so nearly alike that the first selection can be followed by others of the same type. Here the breeder usually has to choose between two courses. Which he will take depends upon his facilities for handling different matings. If he has or can make accommodations for a number of small matings, the best way is to try to mate each bird that appears to him of desirable breeding quality with a view to getting something better from it. This may sometimes admit of mating two or more hens of somewhat different type with the same male, which is not objectionable if by trap nesting or stud mating he can pedigree the offspring. But if he cannot do this, and so know the dams of the different chicks produced, he may only make some progress in results without knowing how he got them. Also in this way his experience and the possibilities of his combinations are alike limited on the male side of the matings, and after all—in the great majority of cases—the hens that do not match the one selected to mate the particular male will probably breed better with a male differing from it in some characters.

The more individual matings a novice can make, and grow to maturity a dozen or more chicks from each, the more quickly will he learn how to handle his stock to get the results that he wants, and bring it to the stage at which having selected a female to mate with a certain male he can find six, eight, ten or more sufficiently like her to go into the same mating.

Masculine and Feminine Features in Type

In case a breeder, without being too rigid in selecting his females, finds three, four or five that seem to him to match pretty well: As he looks these over in the pen with the male it may appear to him that the type of some of the other hens harmonizes better with that of the male than the type of the hen he first selected. This impression may be right or it may be wrong. There are several things coming into the question. In the first place, the breeder is apt mentally to compare his tentatively mated pen with an exhibition pen in which the male and females must match as closely as possible, and the character of the females determines that of the male to be shown with them. To look well, the females must match as exactly as possible, and the male to go with them must be one that sets off his mates, being neither inferior to them, nor of such outstanding quality and aggressive masculinity that he appears to be "the whole show." Many an exhibitor, selecting his finest male to head his best exhibition pen, sees when he puts the birds together, or perhaps after they are cooped at the show, that a less-striking male, one perhaps of a more modest mien and a little bit on the feminine type, will make his pen much more attractive, while the individually highly attractive male makes it appear ill assorted.

Further, in all large breeds the limitations of the average exhibition coop are a handicap to the big, rugged birds that look best in the yards. So unless a breeder has the differences in conditions well in mind, he is apt to imagine that his best type male is a little coarse as compared with the best exhibition type of male. Generally it is the other way—the bird that shows best, especially with a pen of strongly feminine-looking females, is a little bit too fine. First impressions in the selection of birds for breeding are usually best. The type of male that looks best in the exhibition coop with standard females has his place in the breeding yards but not usually with such hens as he is shown with. Of course that is always the case in the varieties that are systematically double mated, but we are considering now the others. Though discussion of exhibition pens is only incidental here it may be added that when the right kind of females, in sufficient numbers, can be found to match an outstanding, all-masculine male of quality and the birds are given a coop of ample dimensions, the result is an exhibition pen that stands right out in its class. Comparatively few breeders, however, can find four hens that will match for such an exhibit.

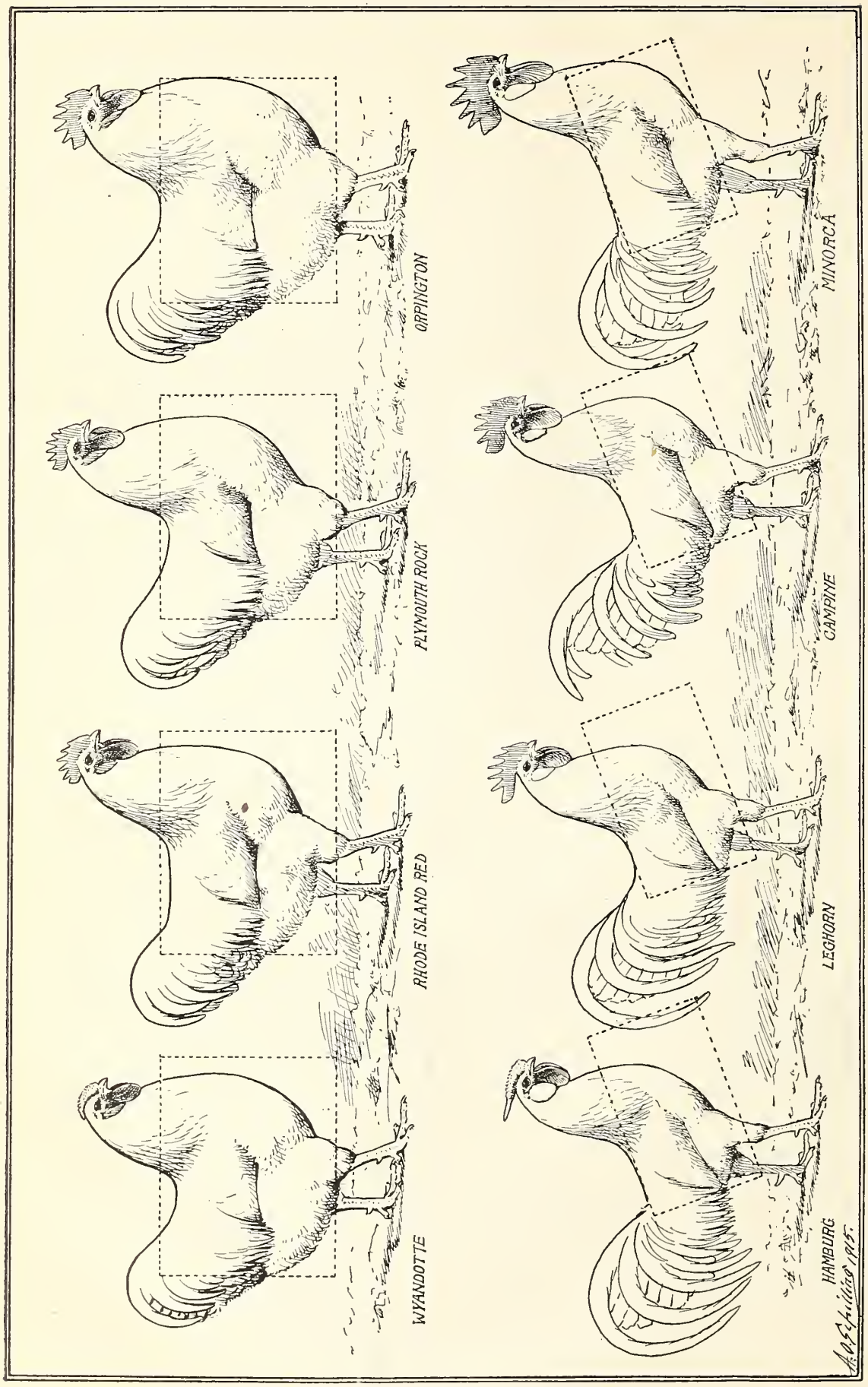


CHART SHOWING THE RELATIVE TYPICAL SIZES, PROPORTIONS AND CARRIAGE OF MALES OF EIGHT IMPORTANT BREEDS OF FOWLS

The dotted line parallelograms for each group of four breeds of the same class are of the same size and in the same position. In selecting birds for breeding, the preference should always be given—other things being anywhere near equal—to those that come nearest to typical form and carriage without being coaxed into the desired pose.

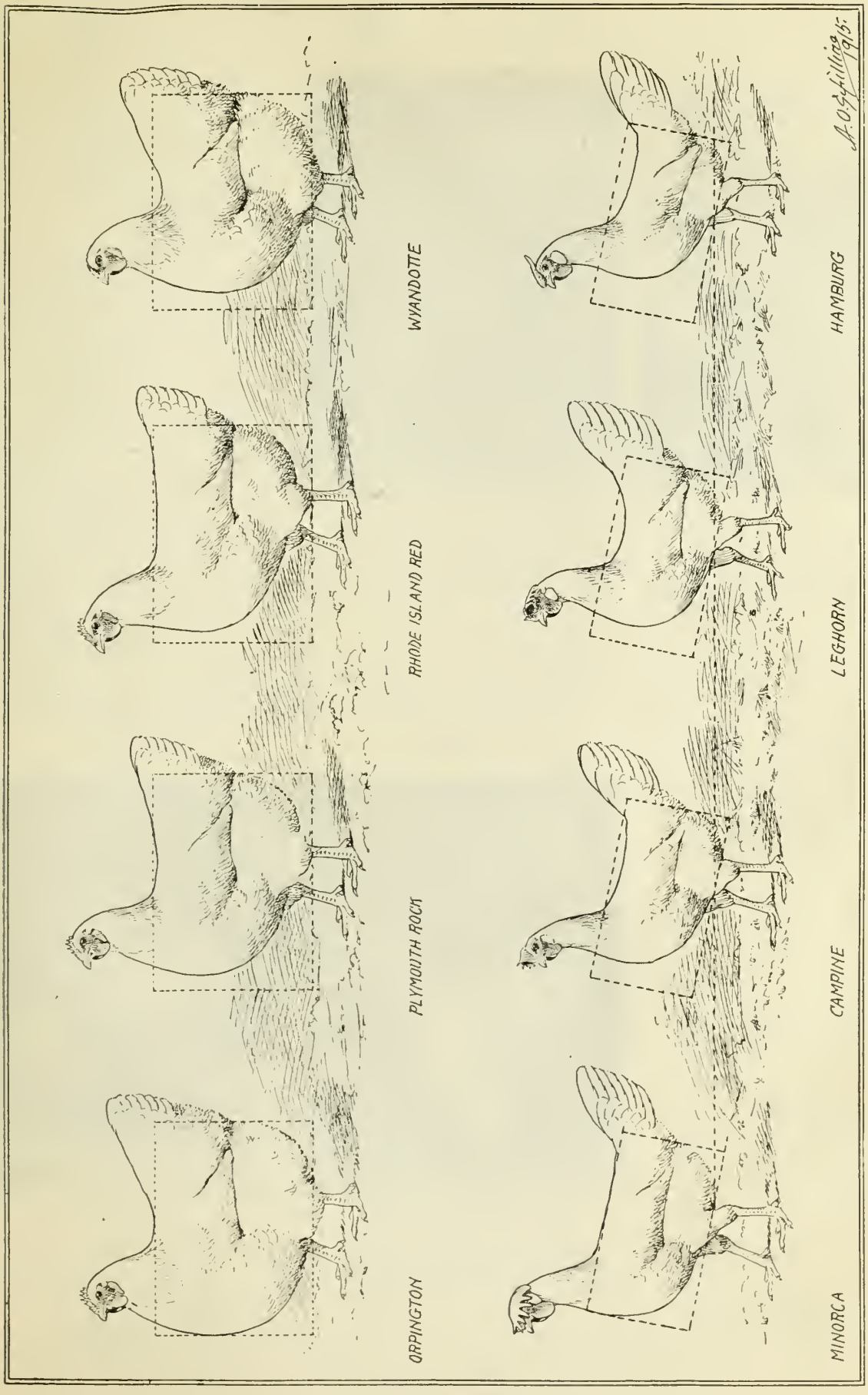
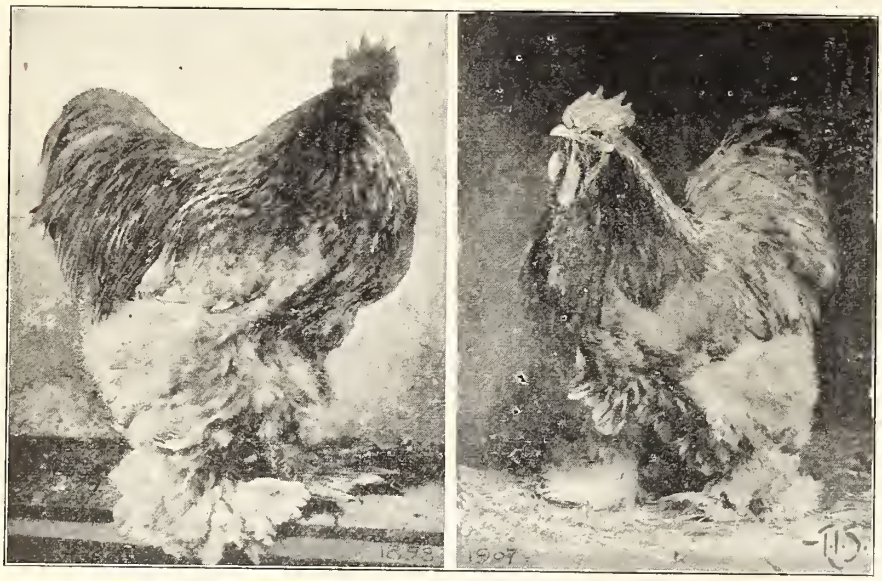


CHART SHOWING THE RELATIVE TYPICAL SIZES, PROPORTIONS AND CARRIAGE OF FEMALES OF EIGHT IMPORTANT BREEDS OF FOWLS

In studying this and the chart on the preceding page, it should be noted that the artist, Mr. Schilling, has carefully indicated the characteristic differences in the carriage of male and female of the same breed, as well as the breed differences. To preserve the best type in each sex the breeder should systematically select—as far as consistent with due consideration of all qualities—birds that commonly show good sex character.

As far as type is concerned the breeder should stick to his first impressions unless he can convince himself positively that they were wrong. The bird selected as of the best type may have to be discarded for something else, or mated another way, but that is a different matter. Usually the hen or hens that should be discarded for type are those that are added last. A breeder is apt to be a little lenient in his judgment of type for the sake of getting as many females as possible to mate with a favorite male, but if he puts in hens that are not quite what he likes, the chances are that every time he looks at the mating he likes it less than before. The wise thing to do then is to look for the hen that seems most a misfit and take her out, and continue this until the hens look quite uniform to him. Occasionally a mating is improved by a change of males, but that does not often happen in a first-choice mating; it is much more likely to occur in matings to use birds that are more off-type or conspicuously faulty in a particular point.



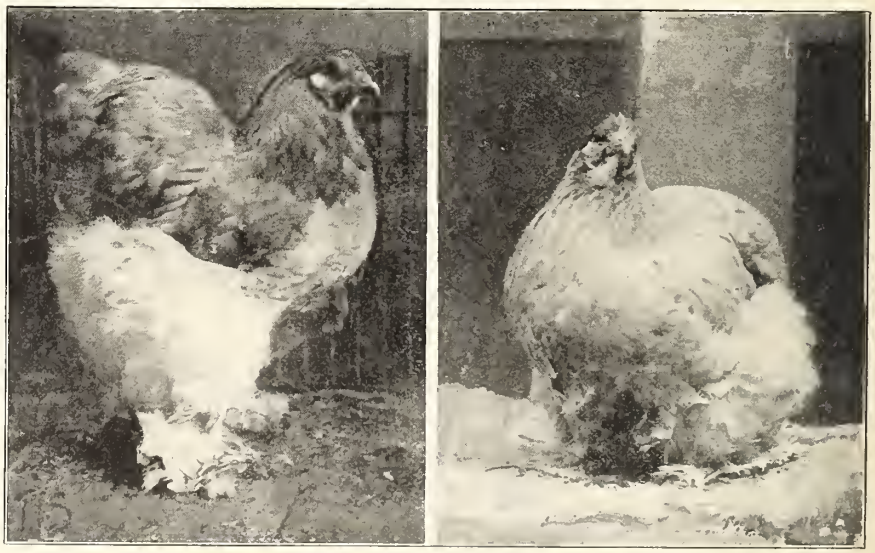
TWO COMMON TYPES IN COCHIN MALES

Some of the points to be considered in mating are best illustrated with specimens of breeds having exaggerated characteristics. The Buff Cochin male at the left has good style and type for a male, but females of his line will generally be too high stationed to look well. (See the female at the left below). The male on the right seems a good Cochin until put beside the other.

How Good Selection Leads to Close Breeding

In general it will be found that the better the quality of a bird, the greater the likelihood that the most appropriate mate for it will be one of its own line and very near kin. As was stated in the chapter on line-breeding, the characters possessed by an individual are most surely and quickly fixed in a line or family by breeding so that the blood of that individual becomes greatly preponderant in the race. But the breeder should also keep constantly in mind what was there pointed out, that the number of birds good enough to head a line is very small, and in all ordinary matings the question of close breeding to get in the line the quality of one individual does not enter into the problem. The object of the ordinary matings is always to combine two individuals, of good but not extraordinary quality, each having numerous small faults or undesirable tendencies, so that a good proportion of the progeny will be better (by the Standard of Perfection, or any standard the breeder uses) than either of the parents.

In all ordinary matings the best thing for a breeder to do is never to consider the matter of relationship of birds except in connection with the reduction or elimination of faults. If he finds that a male and female that in most points are suitable to mate together have one bad fault in common, and the male and female are near kin, the chances are that the fault will be prevalent in their offspring, and may be in aggravated form. But if a male and female, though having the same serious fault in common, are not near kin there may be a chance that they will produce a good proportion of offspring without it. So if the mating was in every other respect a most desirable one, an experienced breeder would be willing to take a chance on unrelated birds where he would not on closely related birds; but having taken this chance once he would be most careful not to take it on the same fault in the progeny of these birds for several generations.

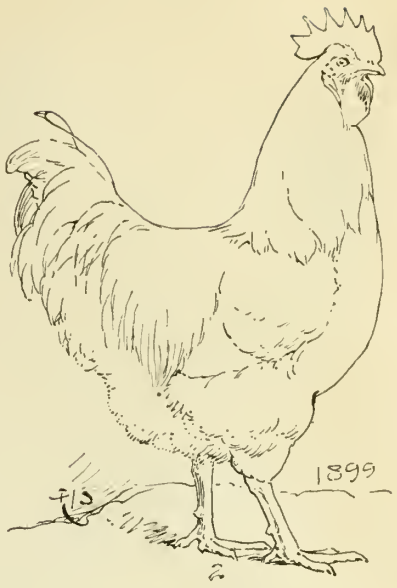


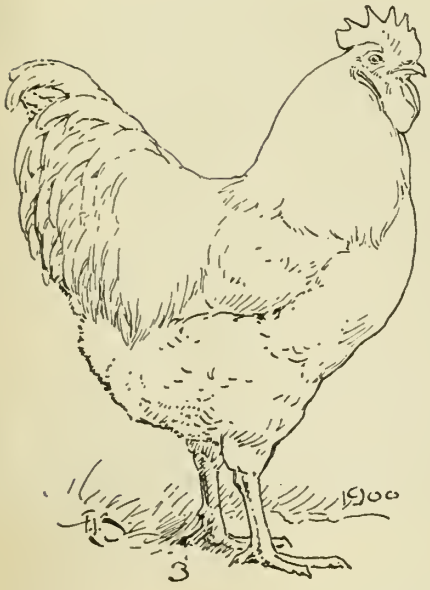
TWO COMMON TYPES IN COCHIN FEMALES

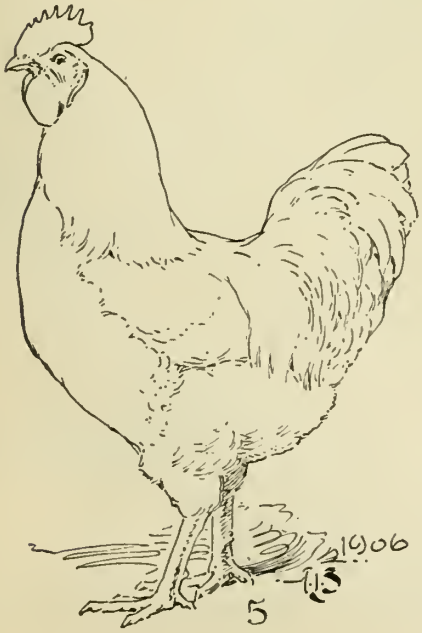
These types correspond with the males above. The females show the faults of their type more plainly than the males. The Standard type is a happy medium between the two shown. It is not only more attractive than either, but more practical. As between these two, however, the higher stationed birds are to be preferred.

Relative Value of Appearance and Pedigree

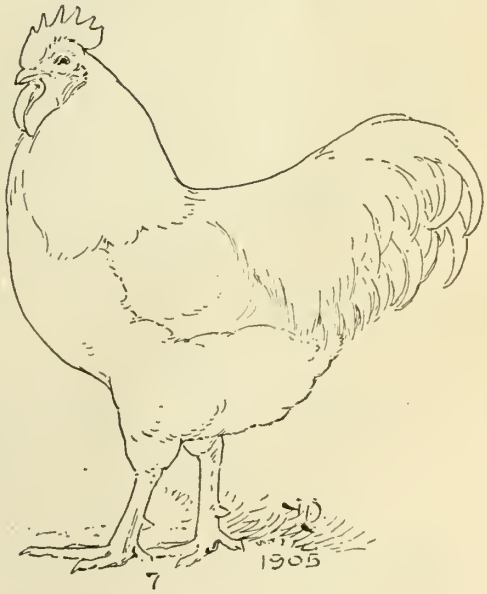
In this connection the general question arises which should be given the preference, or should count most, in selecting birds for breeding—appearance, or pedigree and

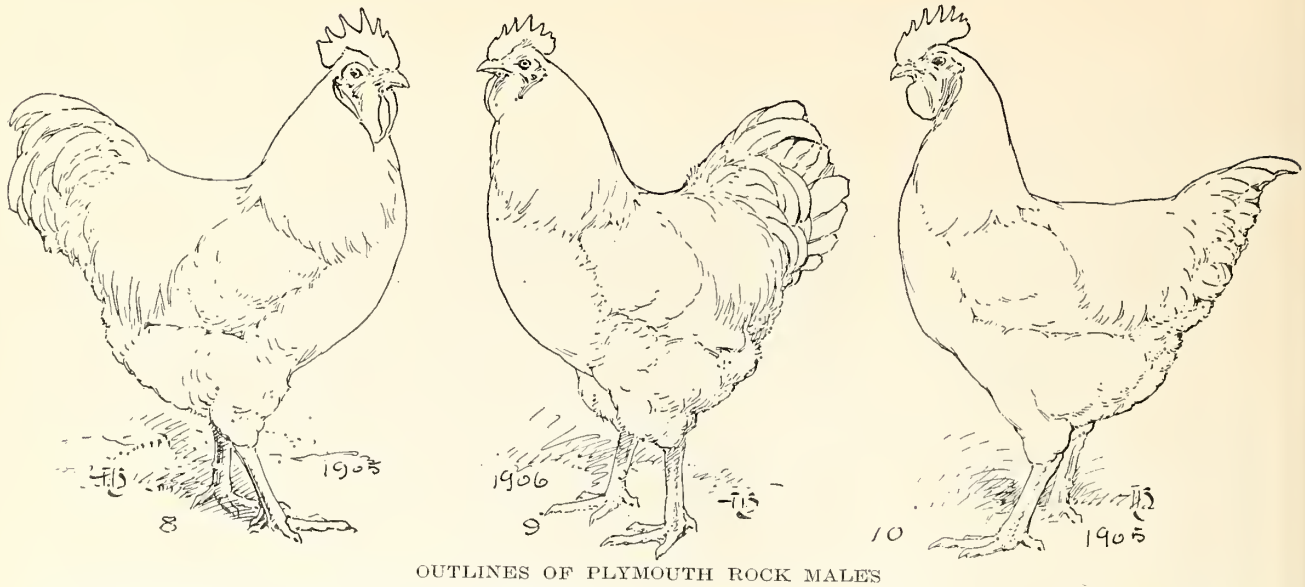






Series of Outlines of Plymouth Rocks showing: Upper row, left—outline of Barred male and female 1873; right—outline used as basis for ideal male for Plymouth Rock Club, 1901. Middle row, left—outline of heavier type of Barred male, a winner in 1900; next, a short-backed, pinch-tailed bird of the same year; right—a Buff Rock male of 1903 regarded as a phenomenal bird in both shape and color. Lower—left, a Barred Rock winner at New York in 1906, a bird of pretty good general form, but not showing a really nice line in any section; right—White Plymouth Rock of 1904-05 that in style was years ahead of his time. The bird is a little long for Standard, and as high on the legs as he can be and not appear leggy. His type is wonderfully good, but in breeding such birds the breeder must be careful to use mates that will check further in case of length and height.





OUTLINES OF PLYMOUTH ROCK MALES

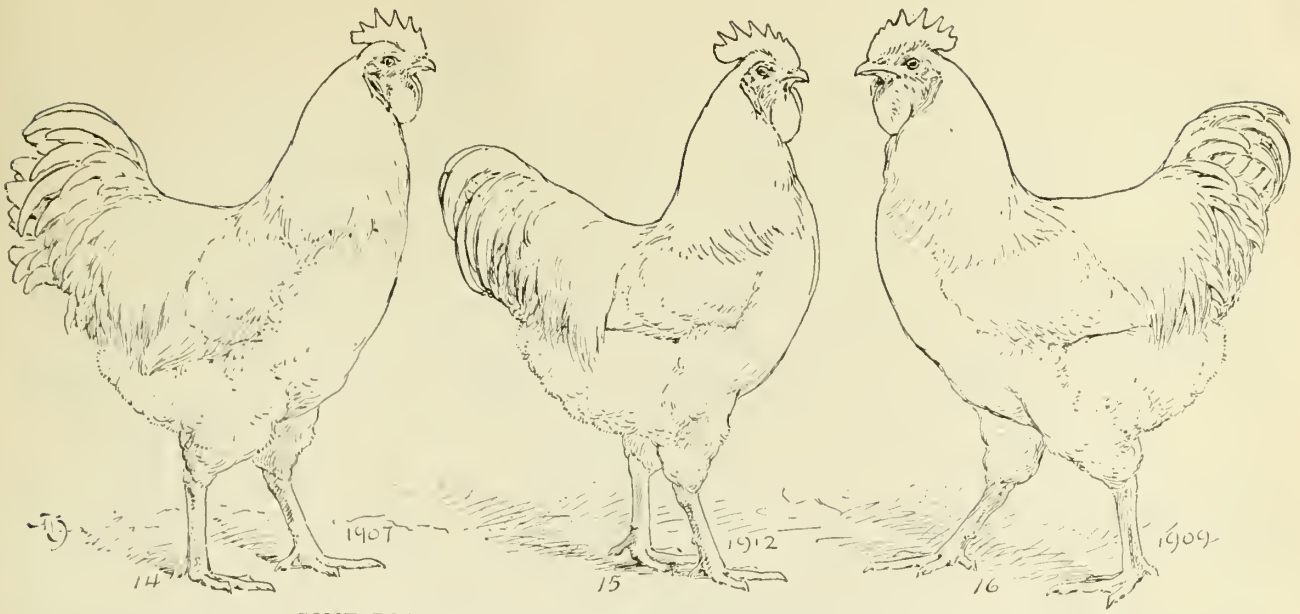
These outlines of old-time winners are duplicated still in many flocks. Breeders often have birds of good quality in other respects, but quite lacking in the refinements of type. The breeding value of such birds depends on mating them to offset their faults in shape. No. 8 is a pretty good shape. With a little more length of back and a tail with lines running more smoothly from those of the back and body he would show quite attractive type. No. 9 is a short-backed and short-bodied bird with a bushy tail. No. 10—a close-feathered bird with a pinched, poorly-developed tail,

performance? In other words, which should the breeder consider most as he makes his matings—the birds as he sees them or their ancestors, or, in the matter of breeding for egg production, their past performance? Opinions differ on this point. Some breeders attach more importance to pedigree and performance (or think that they do). The writer has never known any experienced and skillful breeders who really did, except some of the breeders of laying strains who have mated their stock on trap-nest records. Practically the only difference between the breeder of standard stock who attaches most importance to the appearance of the birds mated and the one who attaches most importance to their ancestry, is in their order of procedure in mating. The former looks for birds of a certain appearance, the latter for birds of certain pedigrees. The former does not consider pedigree except in connection with a common fault; the latter when he too finds the common fault discards pedigree and looks for a bird that has first of all the right appearance. In the end both do the same thing.

In a true analysis of the points involved in this question appearance must be rated of prime importance, for the object of the breeder of stock to any standard is to cultivate and establish the character of the direct transmission of characteristics. He particularly wants to avoid the manifestations of alternate inheritance (disappearance of a character in one generation to reappear in the next). In reality the breeder to standard mates for the features of that standard. While in doing this he considers both the birds as he sees them, and all known facts

OUTLINES OF POOR TYPES FOUND IN PLYMOUTH ROCK MALES

No. 11—suggests the Langshan. No. 12—a bird with poor shape and carriage of body partly concealed by profuse plumage. No. 13—a very long-bodied and ill-balanced bird. Both 12 and 13 have their faults of shape partly concealed by the pose in which they were photographed. Standing with necks extended they would look much worse than as here shown.



SOME POOR PLYMOUTH ROCK SHAPES AND A GOOD ONE

No. 14—a rangy bird with a bushy tail. By mating to modify his faults he might produce offspring of very nice type. No. 15—a very common type of Plymouth Rock when birds much under weight are frequently used in the breeding pen. No. 16—large male of good type; tail is a little long and carried a little high, but with the bold general carriage of the bird this is not as objectionable as in a bird of less style.

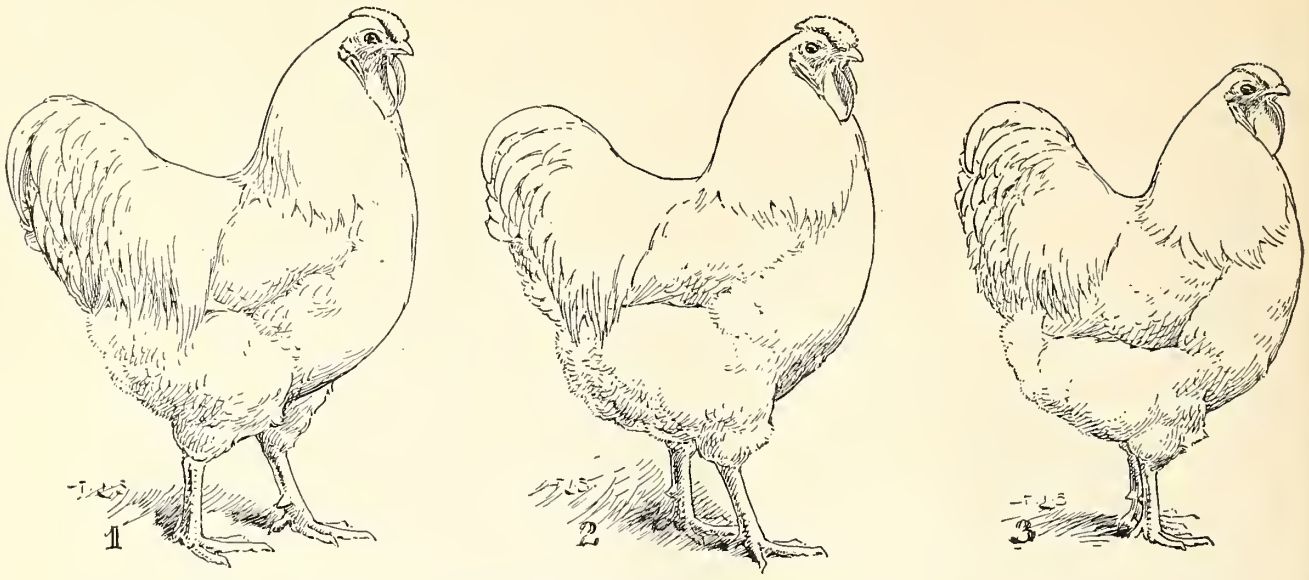
that might influence their transmission of racial and individual characters to their offspring, it is absolutely immaterial in what order these facts are considered. The essential thing is that each point shall be considered and given due weight.

Most Rigid Selection for Males

Theoretically and also in carefully pedigreed matings, the male and female are of equal importance in breeding. But in ordinary breeding it is both good policy and entirely practical to be much more severe on the superficial faults of males than on the superficial faults of females. Aside from the commercial breeders operating on a large scale and a relatively small number of amateurs breeding a few high-class birds, the masses of poultry keepers and breeders are combining breeding with practical poultry keeping and the number of birds they need for breeding purposes is much less than the number they need for the production of poultry for meat and eggs. For those in such circumstances it would be manifestly absurd to practice severe selection for superficial faults in all hens used for breeding. The wise policy for them is to mate for the production of their breeding males for all matings, and of females for choice matings, specially selected pens in which are females as well as males mated for quality at every point. Then in their general matings they may

MORE PLYMOUTH ROCK MALE TYPES

No. 17—a good model to follow in selecting Plymouth Rock males as near as possible to Standard type. No. 18—down-to-date model of the long-bodied style. No. 19—coarse, long-backed, low-tailed style, an awkward bird and usually slow to mature.



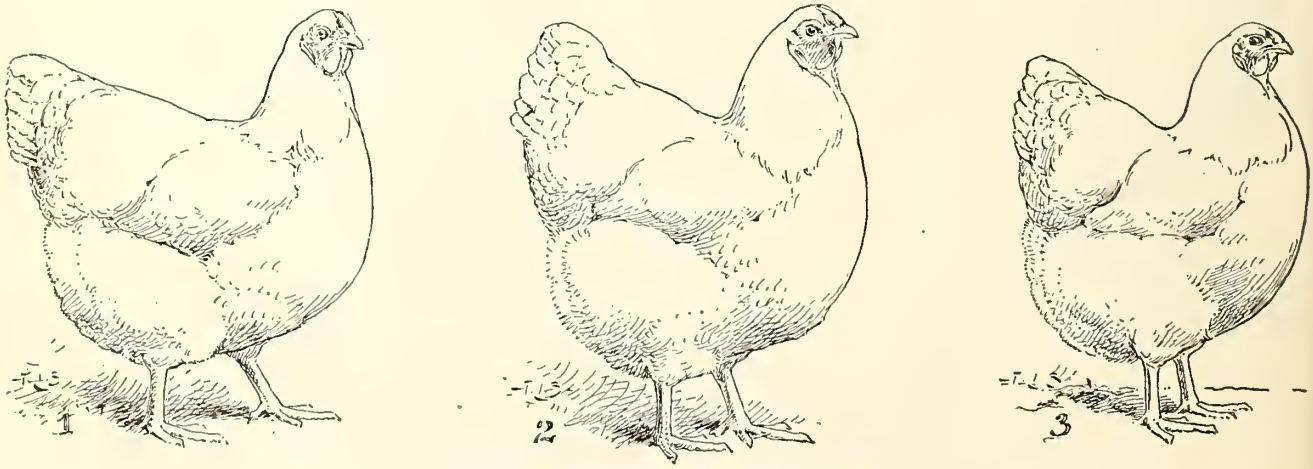
OUTLINES OF WYANDOTTE MALES

No. 1—nearest approach to Plymouth Rock shape permissible in a Wyandotte. No. 2—style of Wyandotte commonly accepted as meeting the Standard specifications calling for moderately short body and short back. No. 3—an extreme type of Wyandotte with very short back and spherical body, favored by some judges as plainly remote from Rock and Red type.

use females of good type and size, and at least fair color as the birds appear in the yards, but not so good in superficial points when handled and examined carefully. It is usual, in selecting males to mate with such females in "utility" matings, to take birds that are like the females faulty in superficial points; and males that while good in many other particulars have bad combs are very likely to be used in such matings. The result is the perpetuation and intensification of superficial faults in the utility grade of poultry.

If instead of following this practice a breeder making the two grades of matings will make it a rule never to use a male in a utility mating that will not pass as suitable for an ordinary standard mating, he can in three or four years bring all his stock to a stage at which, when not critically examined in the hand, it appears to be highly bred standard stock. This is so easily done that there is really no excuse for anyone having utility stock with unsightly combs, glaring faults in color, or any of the ugly features too commonly prevalent in stock of this class. On the average, only one-tenth as many males as females are needed for breeding purposes. Hence, for ordinary matings the breeder can be ten times as careful in selecting males as in selecting females. It is often said that the proportion of high-class males produced is smaller than of females. That is true only as to particular cases, and to offset these there are quite as many cases where the conditions are reversed. On the whole, the proportions are about equal, but perhaps in the majority of cases it will APPEAR that the females run better than the males because in so many conspicuous characters a fault in the male is more conspicuous than the same degree of fault in the female.

In examining his stock for mating a breeder almost invariably finds one or more points in which nearly all birds fail. As far as possible he mates for improvement at this point, but where a fault is so characteristic it is wise to look for one or more birds outside that can be used to correct the fault. A careful breeder does not discard the males of his own stock and bring in new males strong in the point in which his stock is weak, and of doubtful value in other characters, but uses a small num-



OUTLINES OF WYANDOTTE FEMALES

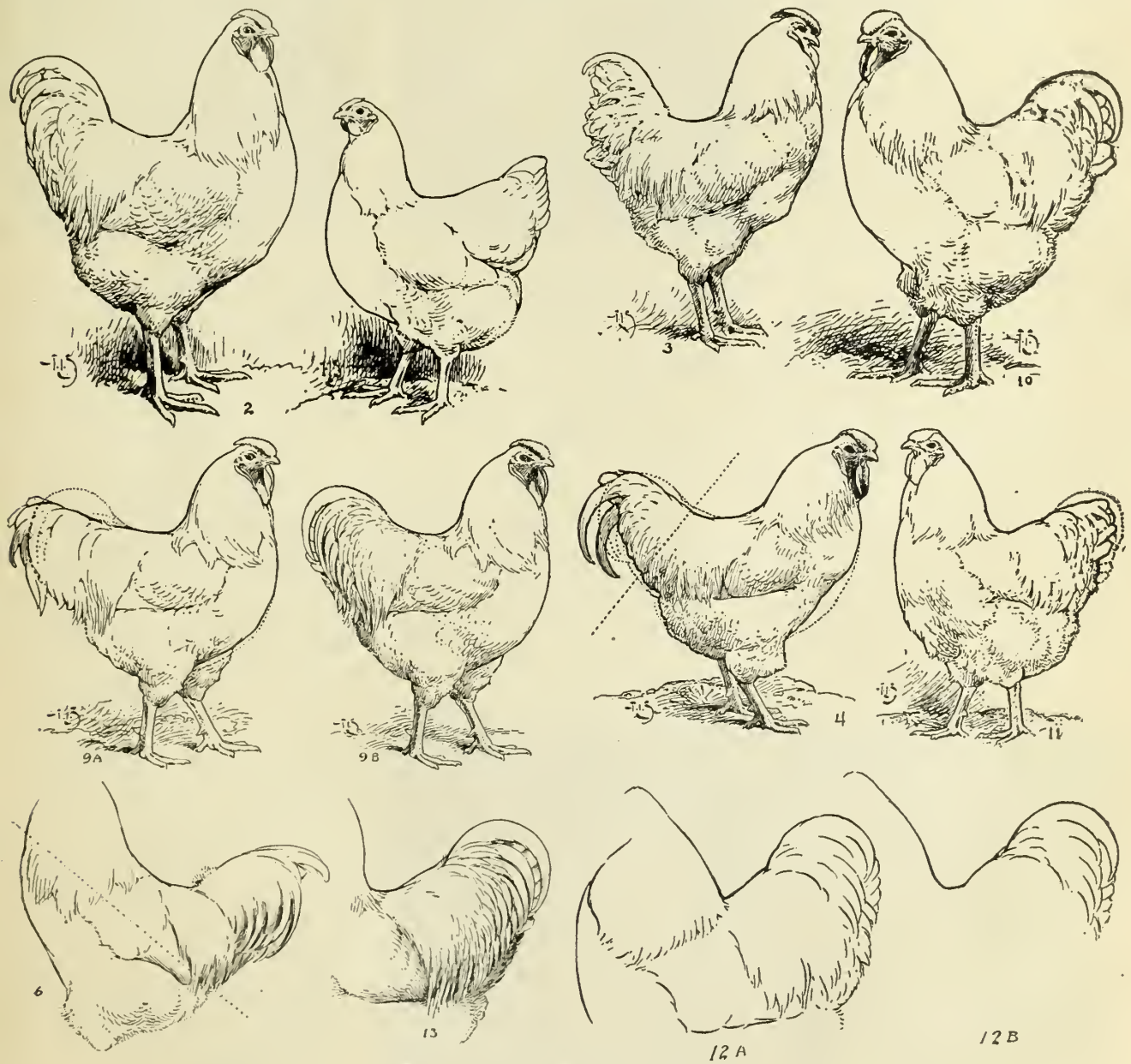
No. 1—medium length of body. No. 2—moderately short body. No. 3—very short body.

ber of new birds—possibly from different sources—in special matings, until he hits on something that will combine with his stock and improve the weak point without loss at any other point.

Special Matings for Male and Female Shape

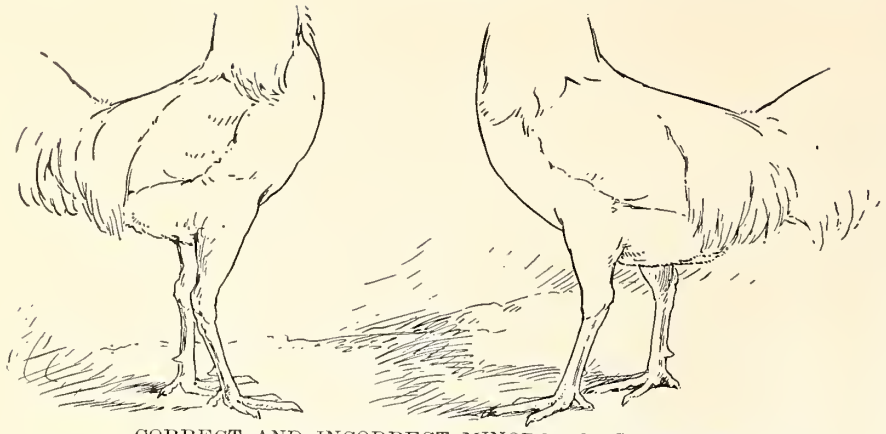
The occasion for systematic double mating for color in certain varieties was explained in Chapter II. It is generally supposed by those not familiar with breeding matters that double matings are practiced only in such varieties. While it is true that there are only a few varieties in which the sexes are regularly produced from entirely different and unrelated lines, it is a common occurrence in the breeding of standard poultry for a mating to produce a better type of one sex than of the other, because the most attractive male and female types differ along the lines commonly designated masculinity and femininity. Standing in comparison with other males, a male of pronounced masculine character and type will be more attractive than one equally good in color and in every detail when considered separately. Also in a competition of females the finest feminine type is most attractive unless completely overshadowed by some brilliant quality in a hen of more masculine bearing. So it happens over and over that a breeder with a winning line of males, and with females of the corresponding type—as Nature produces them, finds his females outclassed by those of a breeder whose males his easily beat.

Not only may particular matings produce better specimens of one sex than of the other, but that characteristic may persist in a line, family or strain, either through the breeding tendencies of the stock, or apparently—in some cases—as a result of the preference of a breeder for



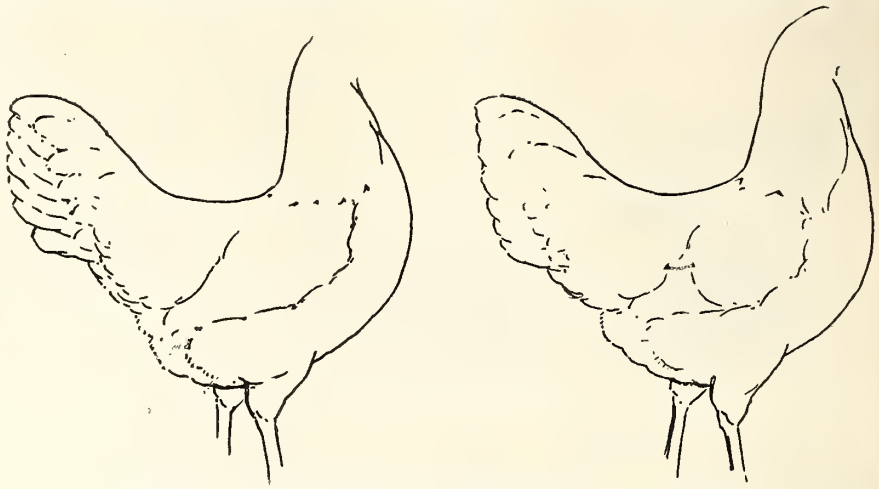
SOME STUDIES IN WYANDOTTE SHAPE

No. 2—type of White Wyandotte derived from the Silver Laced variety in 1886. No. 3—a White Wyandotte that won at Boston in 1900. No. 10—a bird bred by the same exhibitor as No. 3, that won at New York in 1909. No. 9-A—a winning Silver Laced Wyandotte at New York 1909, a symmetrical bird with wrong carriage of tail. No. 9-B—outline of the same bird drawn with correct carriage and length of tail. No. 4—a winning White Wyandotte at Boston 1901. No. 11—a winner at the same show in 1910. No. 6—long tail with poor carriage of body. No. 13—correct carriage and good tail. No. 12-A—short back and profuse plumage entirely concealing the line of the back. A male with such a back should be mated with hens long in the back for Wyandottes and carrying the tail low. The result should be backs in the male offspring as at 12-B.

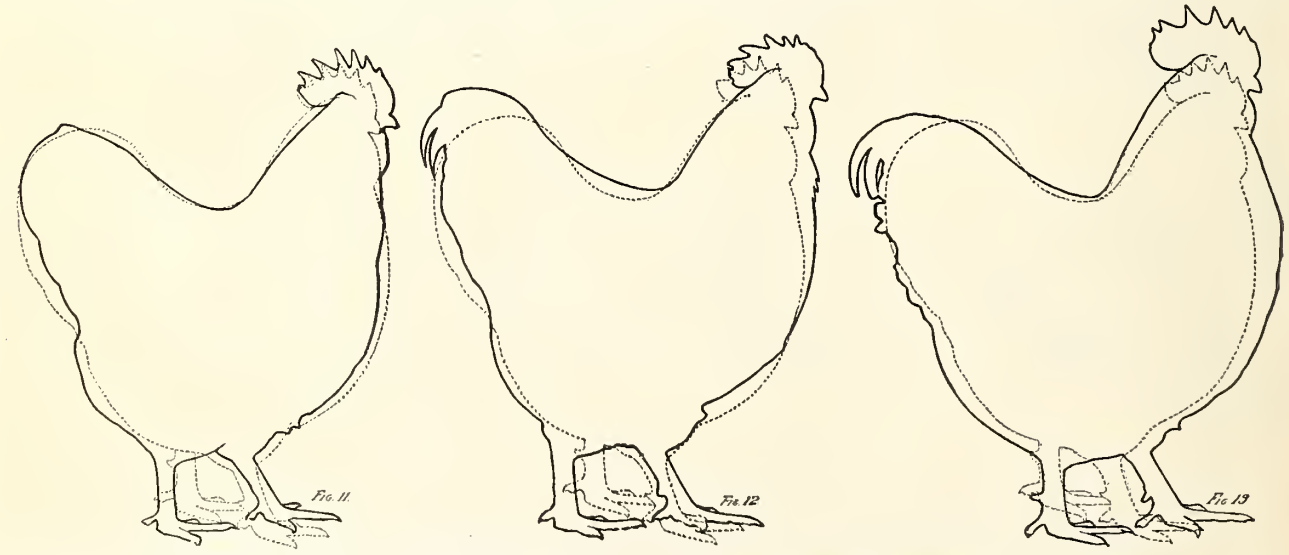


CORRECT AND INCORRECT MINORCA MALE SHAPE
Left—a small-bodied, leggy bird. Right—Standard shape and carriage, a symmetrical body properly balanced.

a type in one sex that harmonizes better with the interpretation of the standard generally than his selection of a type in the other sex. While there is a common tendency for the sexes from the same parentage to be of corresponding types, one the masculine and the other the feminine expression of the type, that is not an invariable rule, and the plasticity of characters in combination is such that persistent selection — whether conscious or unconscious—often results in stocks that produce much better quality in one sex than in the other. Every careful breeder tries to avoid this as far as possible, for the most valuable stock is that which will produce the highest quality in both sexes; but birds of high excellence—near perfection in all standard points—are never so numerous that a breeder can afford to quarrel with the way they come and neglect a line that produces superior stock of only one sex. Besides slight differences in general type, the combs and crests of fowls, to produce the nicest type in each sex, must be of a little different size and character. Thus in the Leghorns and other breeds with large single combs, the comb of the male must stand erect while that of the female must turn drooping to one side. If a breeder could give his attention to comb alone he could probably by careful selection secure the precise size and texture of comb that would stand straight in males and fall over as desired in females. But with the natural variability from such a type when secured, and with many other points to be considered, there will always be many fine males with combs a little too thick to fall over as desired when the same comb occurs in a female; and there will also be many females with model female combs that if mated to produce combs like their own in their daughters will produce sons with combs too weak to stand straight. In the Brown Leg-

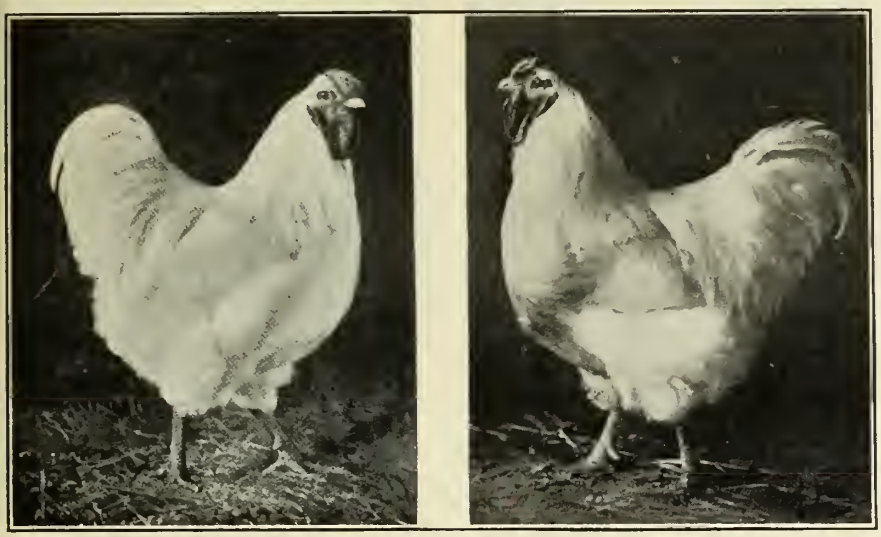


PRESENT AND PAST STYLES LEGHORN FEMALE TYPE
The outline at the left shows the carriage of the ideal hen in the 1910 Standard; the other, the carriage in the 1915 Standard; with the head carried more forward. In selecting for breeding the preference should be given to birds that habitually maintain the desired carriage.



ORPINGTON MALE OUTLINES SHOWING HOW HIGH-CLASS WINNERS FAIL IN TYPE
Left—a first prize Black at Madison Square Garden. Center—a first prize Buff at the same show. Right—a first prize White at Boston. Dotted lines—outline of Standard male Orpington shape.

horn, where the exhibition male and female come from separate lines, the comb problem is easily regulated by regularly breeding in the male line a comb that does not fall over in the females as much as is desired in the exhibition female; and in the female line a comb that is a little weak in males. In other varieties the breeder must keep as near as possible to the happy medium, using the compensation principle to balance the development of the comb as nearly right as possible for both sexes, and taking particular care not to mate birds that would give extreme results in either direction.



WINNING REGAL WHITE WYANDOTTE MALES, 1913

The illustrations on this and the four following pages show the uniformity of type and quality in the leading strain of White Wyandottes, the "Regal Strain", bred by John S. Martin, Port Dover, Ont. The birds above, on left—first cockerel at Boston 1913; right—first cock in the same competition.

Where the comb should stand straight in both sexes, as in the smaller single combs, and the other forms, there need be no serious difficulty in getting equally good combs in both sexes from the same mating, but it should be recognized that the smallest comb that looks well on a male of any breed will be in its feminine form smaller than the comb that looks best on the female of that breed; and that the largest comb that looks well on a female will, in males, be too large.

In the crested breeds the masculine and feminine types of crest look a little different. The feathers of the crest of the male are long and narrow like his hackle feathers, and his crest looks best when the feathers part in the middle in front and fall regularly from this part to the sides and back. In the female with a crest composed of shorter, wider feathers, the prettiest crest is that which is nearly globular and shows the least parting or indentation in front. Hence the nicest male crests are produced from matings of males with standard crests and females in which the crest tends to part in front; and the nicest female crests are produced from females with standard crests and males in which the crest feathers instead of parting smoothly in front tend to stand out stiffly, giving the crest a somewhat ragged appearance.

Both in combs and crests most persons breeding on a small scale find that they must either breed for the finest type in one sex and take the fault that goes with it in the other, or breed something intermediate between the two forms. Which course to follow depends mostly upon the class of the stock and the kind of competition they know that furnish the apparent contradictions in the to win on one line than to fall just short of winning in both. In ordinary competition one may win on both sexes without the highest excellence in either.

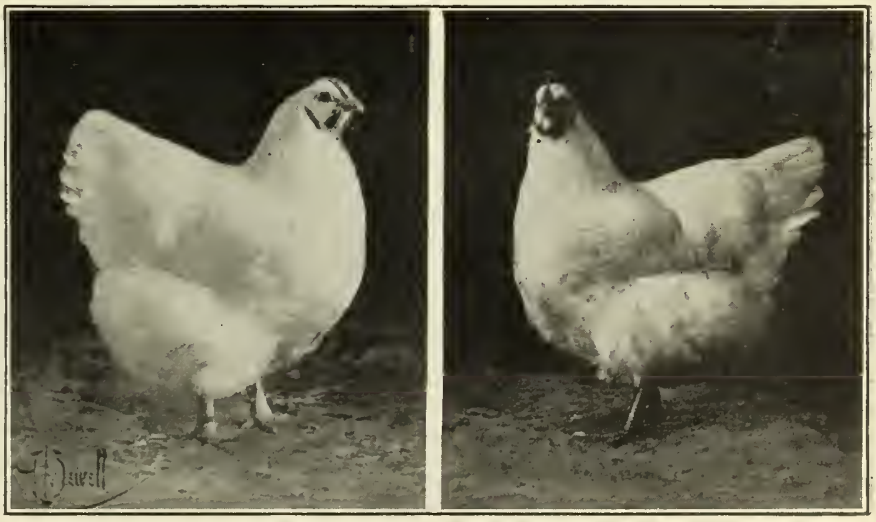
Consideration of Color Points in Mating

In practical breeding a poultry breeder considers color as he sees it in the variety he breeds, and is apt to regard matters relating to the production of other colors as of no interest to him. But thoroughly to understand color problems one must have an interest in and knowledge of the behavior of the colors he is working with in other patterns, and also of other colors under a variety of conditions. As long as his knowledge is accurate it is helpful and does not in any way confuse the problems of his particular color pattern in his mind. It is the things that are not so which breeders think they know that furnish the apparent contradictions in the laws of the reproduction of color.

In this discussion of the mating of fowls for color we shall take up first the three "solid" colors—white, black and red (including buff); then the all-barred pattern; and after that will consider the other patterns systematically beginning with the simplest, and treating the identical patterns in different colors together.

Mating for White Color

It is often said that white is not a color, but the absence of color. However that may be in any other case that might be cited, white in poultry is a color. Only the most skillfully bleached exhibition specimens of white



REGAL STRAIN FEMALES, 1913

Left—first hen at Boston; right—first pullet.

REGAL WHITE WYANDOTTE WINNERS IN 1915
The hen in the center, "My Maryland", won first at Hagerstown in 1915. As a pullet she made a record of 205 eggs in twelve months.

birds are an absolutely pure white, and only highly bred white fowls will stand comparison with anything that is really white. In the specifications for white fowls in the earliest Standards, white, pure white, and clear white were the terms most commonly employed, but in the descriptions of the color in some sections, and sometimes in nearly all sections, the qualification was added: "as free as possible from any yellowish tinge." Common, ill-bred white fowls usually have a good deal of a yellowish tinge, and also more or less black in the form of flecks or ticks, or grayish spots or marks in the plumage.

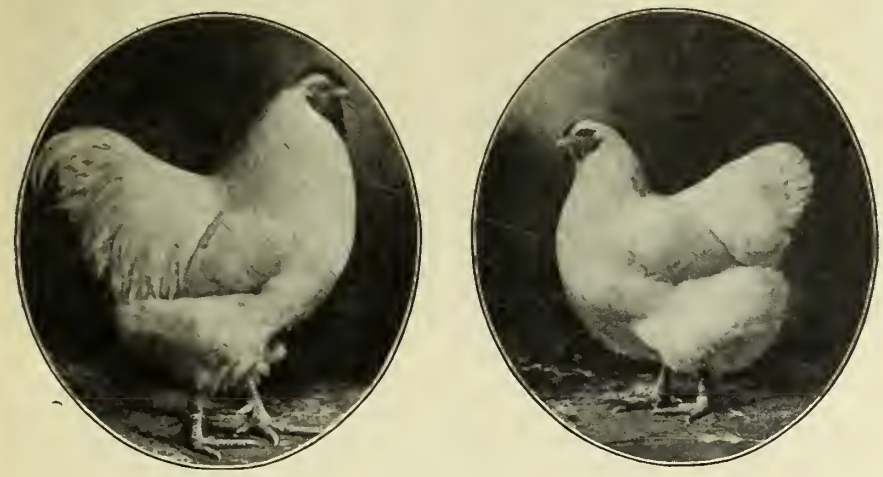
Whether the pigment can be absolutely eliminated from the plumage of a fowl, making it absolutely white, the writer would not undertake to say. He has never seen such a bird, and most breeders declare that although all traces of pigmentation may be bred out of almost all the feathers, a sufficiently thorough search will always show that a few feathers have traces of either red (yellow) or black, or of both colors. It would also appear that the toleration of traces of black in white plumage makes it easier thoroughly to eliminate yellow, and vice versa. If this is a fact it would indicate that what Mendelists call the factor for pigmentation can not be made entirely inoperative, but can be made so nearly impotent that it can produce a certain minimum amount of pigment which may be either black or red or a little of each.

It is the general opinion of breeders of white fowls that the whitest birds are those which have some flecks of black in the plumage. This would be in accord with the theory of a minimum of pigment production as just stated. Supposing such a minimum of black—a very small one—if it appears in a few small flecks, its collection in these will leave the rest of the plumage a pure (or a purer) white; while if the same amount of black is distributed in the plumage in infinitesimal particles the result is absence of flecks and a silvery white plumage. When considering the effects of a like small amount of red (or yellow) in the plumage, with the possible entire absence of black, the case is complicated and the effects of the distribution of pigment obscured by the similar influence of oil in the plumage. Pronounced brassiness can at once be seen as not possibly the result of oil, but slight creaminess cannot be so distinguished. There is still another interesting aspect of the problem of control of small quantities of pigment in fowls with white plumage, but that will come up more appropriately a little farther on.

While the early Standards tolerated a yellowish tinge, specifying that it should be kept out as much as possible,

"Dorcas" (indicated by cross), foundation of John S. Martin's "Regal-Dorcas" laying strain, and nine of her daughters. Dorcas made a record of 241 eggs in one year. The type shown by these hens and "My Maryland" demonstrates that it is not necessary to depart from Standard type to breed heavy-laying Wyandottes.

little progress was made in the direction of breeding pure white varieties. Pronounced brassiness was common, and even the best bred stocks were creamy. Real white birds as we have them now in the yellow-legged varieties were unknown until about 1897, when a very few appeared. From that time the tendency in standard making was to insist upon a pure white, not tolerating brassiness, yellowishness or creaminess at all. It must be admitted that



REGAL STRAIN FIRST PRIZE COCK AND HEN, BOSTON, 1918

this insistence upon a perfection hard to obtain by breeding, yet possible to secure by bleaching, has led to a good deal of deception in preparing white fowls for exhibition. But it cannot be denied that the requirement also brought a great advance in the breeding of white color, and it is not unreasonable to suppose that eventually the "faking" of birds to make them white for exhibition will die out, for no breeder can permanently maintain a trade in stock that will not produce birds that reasonably meet the standard requirement for pure white.

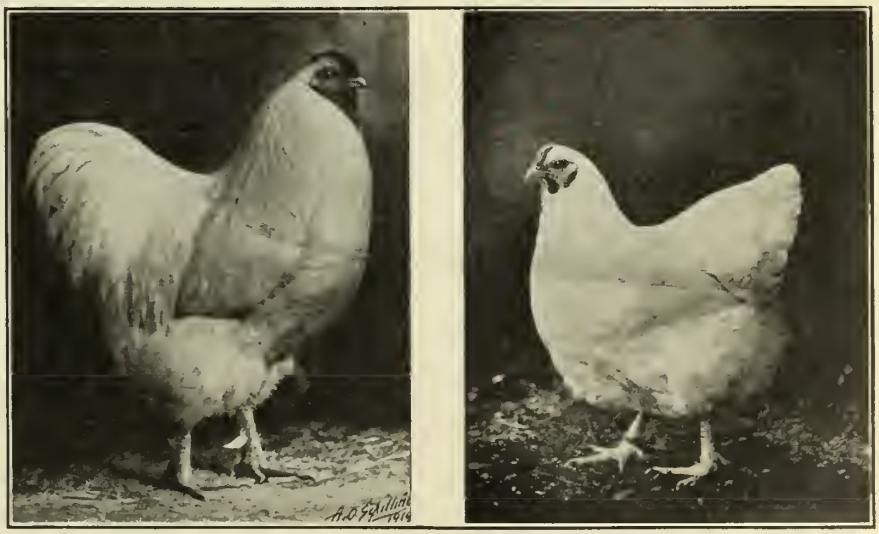
It should be observed in this, as in nearly all points (except possibly in some disqualifications), the standard is not unreasonable. While describing and calling for the ideal form of every quality and character, its whole system of judging is based upon the view that perfection is rarely obtainable, and that the value of a bird as measured by the standard is to be found by carefully estimating the degree of each fault.

When the opinion began to gain ground in the American Poultry Association that the only way to secure general improvement of white color was to make the specification for pure white, vigorous objection was made on the ground that the combination of pure white plumage with rich yellow legs (and skin) was abnormal. It was claimed that good utility stocks generally were stocks with strong yellow skin and legs and distinctly creamy plumage. That this was the case could not be denied. Neither could it be denied that the whitest birds, in the yellow-skinned and yellow-legged breeds usually had light-colored yellow legs. But there were also numerous fowls with brassy plumage and pale yellow legs, and occasionally one with very white plumage and rich yellow legs. It was another case of a common correlation that is not an essential correlation.

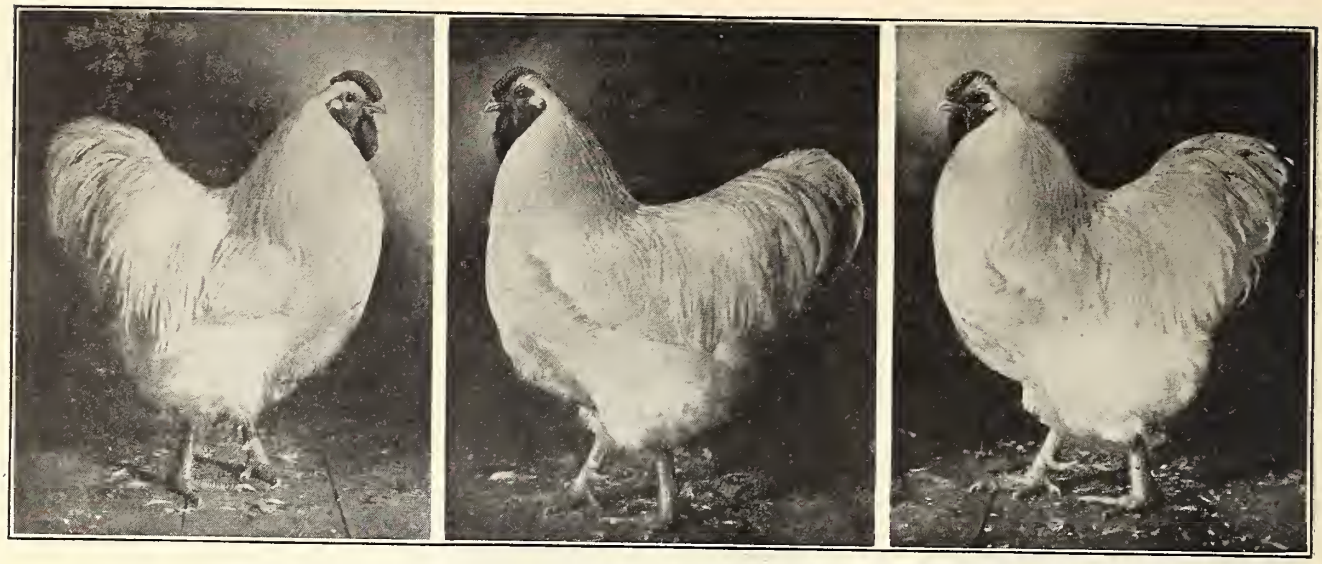
Good white plumage with rich yellow legs is now common in all high-class standard breeds in which the combination is required. The combination is obtained by selecting for both points. It is harder to get and to hold than a poorer quality of color in either plumage or legs, but that is true of all combinations of high quality. The breeder of market poultry, or of laying stock in white varieties, does not need to practice the rigid selection for color that is necessary in breeding exhibition poultry. Neither is there now any excuse for his keeping white poultry that is so brassy that the fault is conspicuous even when not emphasized by contrast with birds of better color.

The combination of white plumage and rich yellow legs, instead of being abnormal—as at first thought it appears—may be in accordance with the theory of distribution of the "irreducible minimum" of pigment as stated above. The possibility of this increases when the combination of white plumage and yellow legs as required in White Plymouth Rocks, Wyandottes, Leghorns, etc., is considered in connection with the combinations of white plumage with lead or slate-colored shanks in the White Hamburg and Polish, with white shanks in the White Dorking, and white or pinkish-white shanks in the White Orpington.

In considering the color of the shanks and feet of a fowl we are really considering the coloring of two different parts—the skin, which corresponds to the skin on the body, and the scales, which are modifications of feathers and have a tendency generally to take the color of the feathers. This is conspicuously seen in the Barred Plymouth Rock in which it has always been difficult to get clean yellow legs in females. And in the White Plymouth Rock we have the case of the tendency (an ances-



REGAL STRAIN FIRST PEN COCK, BOSTON, 1918, AND A WINNING PULLET OF THE SAME YEAR



REGAL STRAIN WHITE WYANDOTTE COCKS WINNING AT NEW YORK, 1919

tral one as well as one associated with the distribution of color) of the dark pigment to appear in the shank long after it has been eliminated from the plumage.

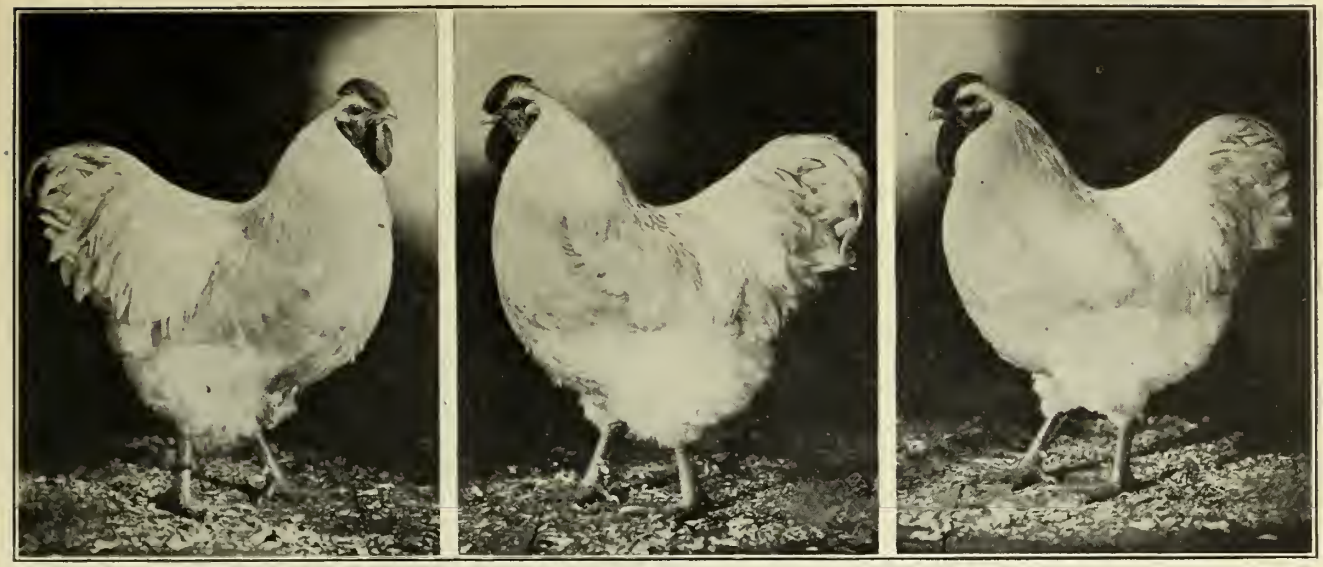
In the White Dorking color has been eliminated in both plumage and shank. In the White Hamburg and Polish color has been eliminated from the plumage, while at the same time a considerable amount of color has been kept in the shank—in both scales and skin. In the White Orpington color has been eliminated from the shank while the plumage retained it, brassiness being more prevalent and in a more objectionable degree in White Orpingtons generally than in any other standard white variety. These facts show conclusively that there is no necessary correlation between the kind and quantity of pigment in the feathers of any part of the body and color of the skin and shanks. Any combination that is desired can be obtained by persistently selecting for it.

A point of great importance to all breeders of white fowls is that in many cases brassiness is principally if not entirely in the decorative plumage of the male (the sections that are red in the natural color of the species) and is associated—apparently—with the male type of feather in these sections. In such cases the females will be very white—not distinguishable from the females of strains or lines in which both sexes are white. Then if these females are mated with pure white males a part, and sometimes the whole, of the male offspring will have the fault in some degree. Many breeders have spoiled the work of years of careful selection for pure white by allowing the blood of a white female from a brassy sire to become widely distributed in their stock.

Mating for Black Color

A leading breeder of a white variety, who in his day was rated as one of the two or three best judges of the variety in America, once remarked to the writer that he had often envied the breeders of black fowls because they had no difficult color problems to contend with—black was black, and that was all there was to it. This man had never bred anything but his own white variety. The fact is that the production of such a black as the Standard calls for, described in recent editions as a lustrous greenish black, but earlier as a rich glossy black with greenish sheen, and frequently described by breeders, writers and judges as a jet black with a metallic green sheen, is one of the least understood of all problems in color breeding in fowls. Few breeders of black fowls have ever professed to be able to produce it with any certainty, and no

REGAL STRAIN WINNERS AT MADISON SQUARE GARDEN, 1919
Left to right—first, second and third pullets.



REGAL STRAIN WHITE WYANDOTTE COCKERELS WINNING AT NEW YORK, 1919

method ever given by any breeder as in his experience unfailing but has been repudiated by some other breeder as unreliable. Most of the best breeders admit frankly that they cannot control the purple barring and the plum color that so frequently appear in a stock or line just when correct color seemed to be fairly well established.

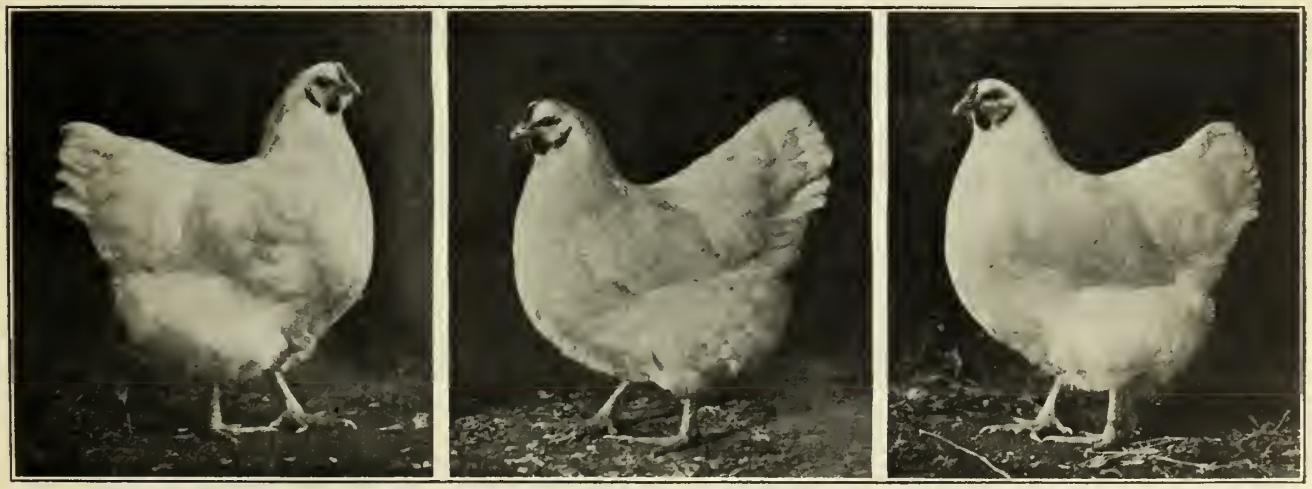
The most plausible and most widely accepted view of the cause of the occurrence of red in black plumage in these forms is that when a certain degree or kind of blackness has been reached by intensification of the black pigment in black fowls—which, as a rule, are modified black, either rusty, brownish black, or bluish gray black—a more intense red appears either in one of the forms above mentioned or as distinct red, this distinct red being most in evidence in the feathers of the neck and back of the male. The principle involved here would be that as the capacity of the pigment-producing function was increased, when it had reached the limit in the production of black color, further intensification would affect the red.

Two interesting facts seem to give some support to this view. The first is the apparent surplus of pigment often noted in black fowls when dressing them for the table. The quills of the feathers are full of it, so much so that it badly soils the carcass and the hands. Something of the same is often seen in very dark Barred Plymouth Rocks and birds of the black-red color type, but not to the same extent. The other point is that in the converse case—intensifying red, as in breeding very dark red color in Rhode Island Reds—it sometimes appears that the red can be carried so far and then black begins to appear in it in the form of peppering in places that should be all red.

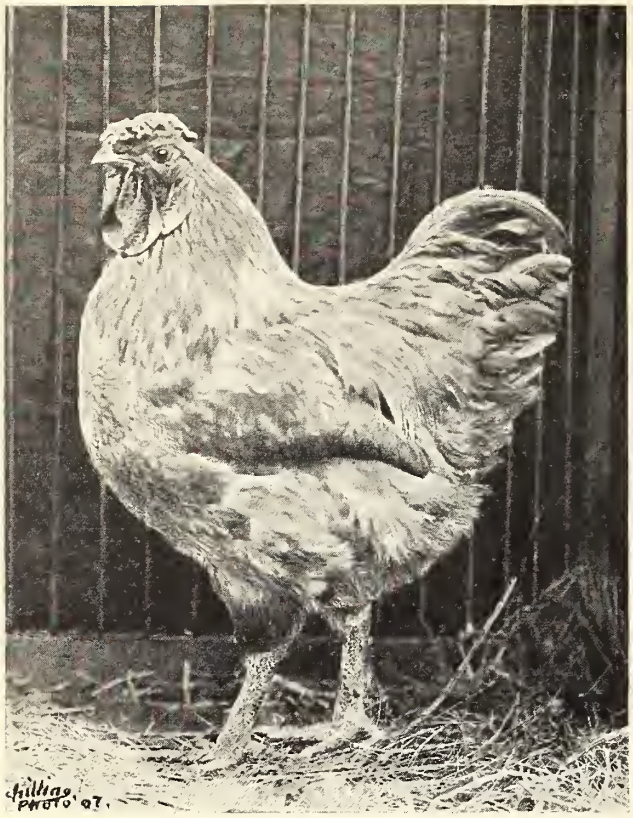
Birds that are of a sound, black color, neither dingy nor gray, do not invariably have the desired greenish lustre, but most of them possess it in some measure and in some it is marvelously fine and uniform all over the specimen wherever the feathers present a smooth surface. In many, however, the lustre is only conspicuous on the neck, back, folded wings and tail, other parts appearing dull by comparison. Remarkably beautiful jet black birds are sometimes seen, especially among females that have a black rather than a green lustre.

Methods of mating to produce standard black color may be reduced to three formulas:

1—Male and female of standard color. This appears to give good results once or sometimes twice after what would be regarded as a fair approximation to standard requirements had been reached; beyond that the ten-



REGAL STRAIN WHITE WYANDOTTE PULLETS IN FIRST PEN AT NEW YORK, 1919

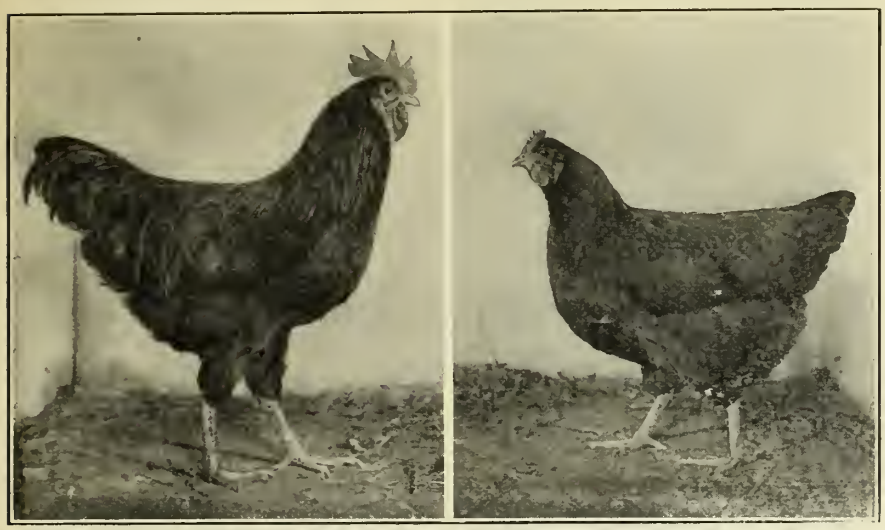


EXTREMES IN BUFF COLOR

Above—male and female of the lightest sound buff. A mating of birds of this color is likely to give many chicks with more or less white—chicks that actually are as faded as the conditions of light when these birds were photographed makes them look. Below—a pair of English Buff Orpingtons of a deep orange buff—a darker shade than is generally favored by American breeders and judges. These extremes of buff should not be mated together. Such matings may produce some birds of a clean intermediate color but are more likely to produce very uneven color.

dency to break into purple barring seems likely to assert itself.

2—Mating of a standard-colored specimen with one a little under standard. Both brown-black and gray-black (with dark slate rather than black undercolor) birds are said often to produce offspring with very fine sheen when mated with standard specimens. In this case it would appear that the near-black bird furnished just the degree of departure from the perfect black required to offset any tendency in the standard-colored mate to purple barring.



FIRST PRIZE S. C. RHODE ISLAND RED COCKEREL AND HEN BOSTON, 1921
On this and the two following pages are shown recent winners of the oldest srtain of line-bred Rhode Island Reds, the "Tompkins' strain" as bred by Harold Tompkins, Concord, Massachusetts.

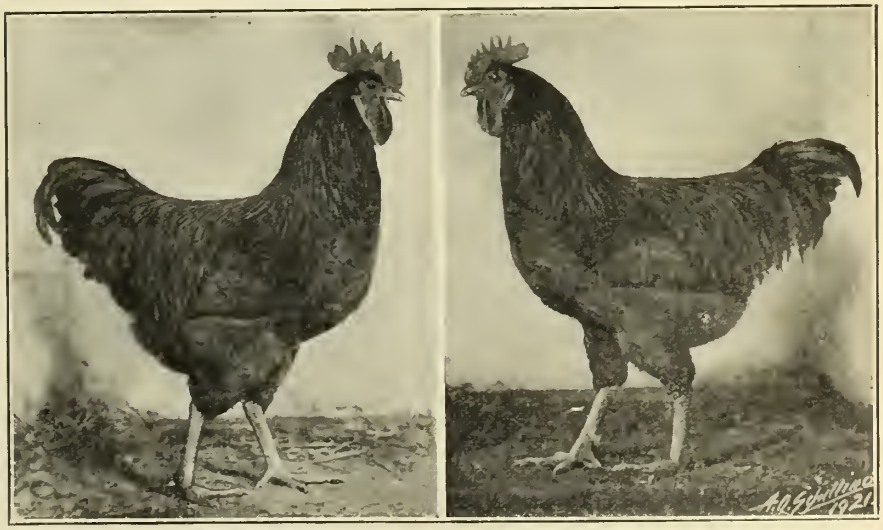
3—Male and female both a little rusty but very near black.

When such a mating gives standard color the presumption is that the breeding tendencies in the two sides of the mating furnished just the measure of intensification of the faulty color of the parents necessary to produce the desired standard color. It may be that a mating of black fowls with grayish tendency will sometimes produce standard color in the same way, but the writer has not been able to learn that such is the case, and on general principles that type of color appears as one that is deteriorating.

Nearly all black plumage has in it at least traces of white. Many breeders of black fowls say that a sufficiently thorough search will always find a little white or gray somewhere, even in birds in which white does not appear as a result of some unfavorable condition. Cases of the latter kind are very common. The fault usually occurs in the form of gray in the flight feathers, especially at the tips, but frequently in a slight grayish cast elsewhere. In mating, it is of prime importance to the breeder to KNOW whether white is congenital and likely to be transmitted, or accidental and remedied by growing the stock properly.

It is quite clear from an analysis of the kinds of matings that give standard black color that the principle involved is the same which applies in every case of holding development at a certain point. Correct judgment in mating is a matter of knowing when to apply the check upon the intensification of a character. This involves thorough knowledge of the breeding back of the birds that are used as well as good judgment of their quality. It is also plain that to breed black color successfully a breeder must constantly have on hand some birds not quite up in standard color, for were he to cull out and dispose of all the otherwise desirable breeding specimens that failed a little in color, and rely entirely upon his standard-colored birds to produce continually the correct color he would soon have his color overdeveloped and would be without the very class of birds of the same general line of breeding required to hold it in equilibrium as near the standard as possible.

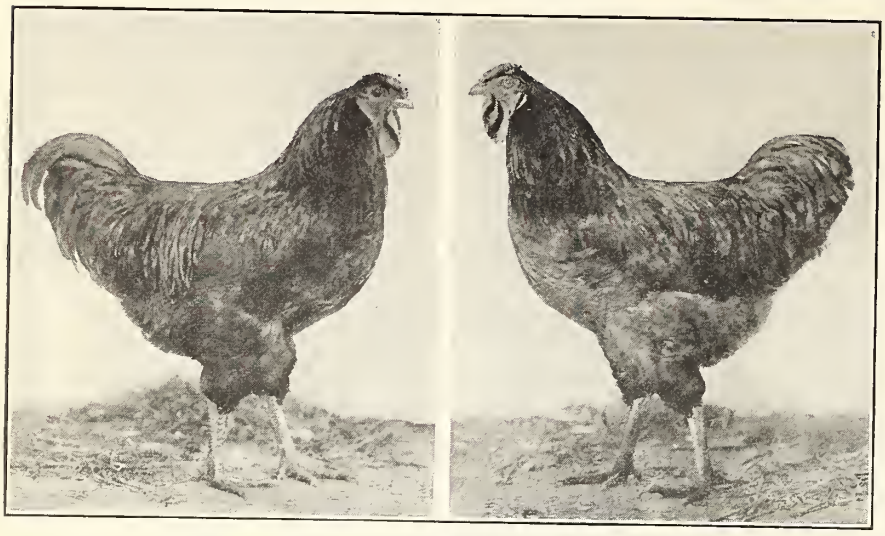
The breeding of fowls with black plumage and yellow legs and skin is also a troublesome problem. The natural tendency is for fowls with black plumage to have dark slate or black legs. In most varieties where this combination with yellow legs is called for the bottoms of the feet are yellow and the scales on the front of the shank and upper side of the toes are of a dark greenish color, shading toward yellow on the back and lower part of the shank and the sides of the toes. It is commonly held that the combination of clean yellow legs with black plumage cannot be realized. Breeders of Black Wyandottes and Black Leghorns are at frequent intervals agitating for a standard description that would allow more black in the leg color than is interpreted to be admissible under the description of color as yellow or dusky yellow. Their contention is that to standardize a darker color of leg would make these varieties more popular. In view of the lack of popularity of the Black Java, a fine type of fowl with the description of shanks and



TOMPKINS' S. C. RHODE ISLAND RED MALES OF DISTINCTIVE TYPE—WINNERS AT BOSTON, 1921
Left—cockerel heading first young pen. Right—cock heading first old pen.

feet asked for these other varieties, it is doubtful that the concession would give the results anticipated.

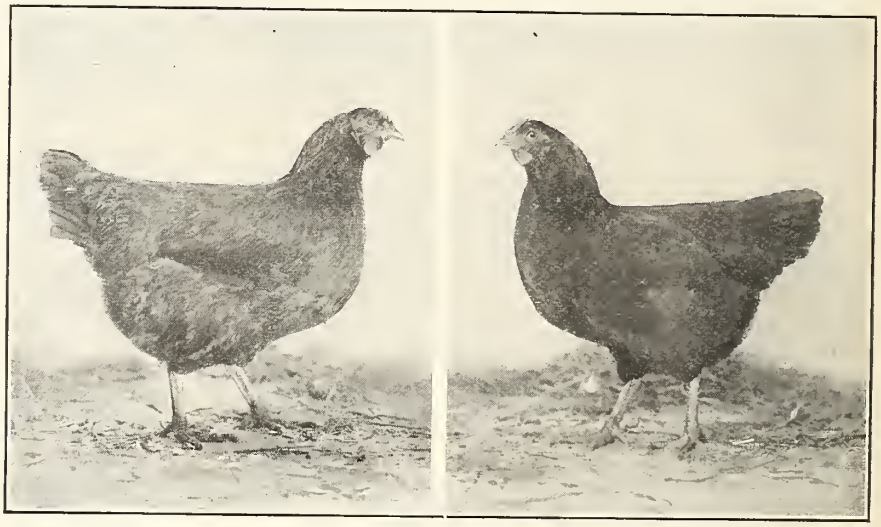
With regard to the possibility of producing what the standard requires, and eventually going beyond it and making a rich yellow leg on a fowl with black plumage, it cannot be regarded as beyond the range of possibilities, in view of what has been done in other cases toward breaking up natural tendencies of this kind. The writer has frequently seen, among the capons in the Boston market that come from the vicinity of Philadelphia, large black birds—evidently crossbred—with rich yellow skin and as good yellow legs as are usually seen on the darkest Barred Plymouth Rock males. It is said that the breeders of yellow-legged black varieties in England get much better yellow legs than here, but on birds with much white in undercolor which has a tendency to crop out on the surface. These two cases suggest directions in which outcrosses might be made to improve the yellow leg, practically to bring the inheritance of leg color from another variety while holding the inheritance of plumage color as it is.



WINNING R. C. RHODE ISLAND RED MALES, 1918
Harold Tompkins' Strain.

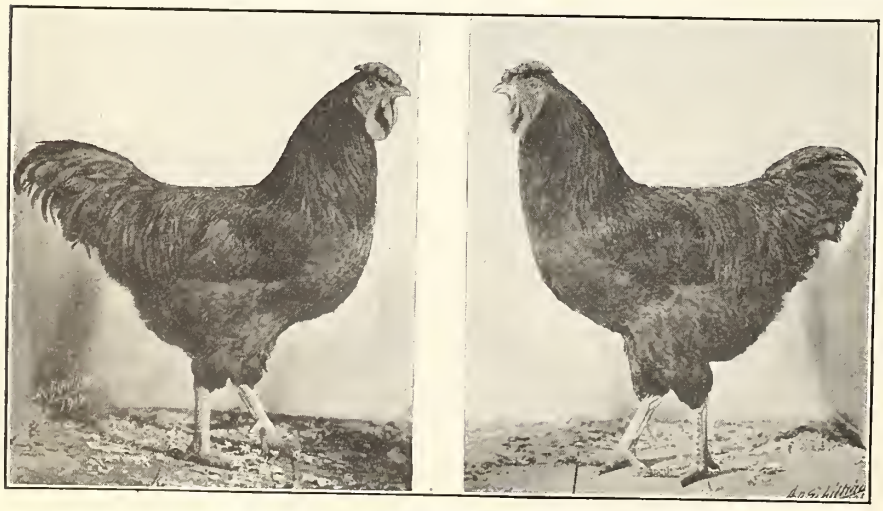
Mating for Buff and Red Color

In the "Instructions to Judges" in the Standard of Perfection, it is specified that: "In competition for sweepstake prizes, when solid-colored specimens compete with parti-colored specimens, white specimens shall be handicapped two points each, black specimens one and one-half points each, and buff specimens one point each." This provision gives those who are not familiar with the problems of breeding different color patterns the idea that it is easier to breed a good buff bird than a good one of any parti-color, or even than a red—classed as a parti-color when accompanied as it is in all present standard red varieties with black in tail and wings.



WINNING R. C. RHODE ISLAND RED FEMALES, 1918
Harold Tompkins' Strain.

As a matter of fact, there is no color in fowls so hard to produce and to hold as an absolutely sound buff or red, all over the bird, and the same shade in every section. And on the other hand there is no other color or color pattern in which the common faults of color as they develop with lack of care in breeding, and to some extent even after long careful breeding, are so conspicuous and so objectionable. The ill-bred buff or red bird is a motley of shades of its varied ancestors. It is only by the most rigid selection and careful line breeding that soundness and uniformity of color can be obtained. In

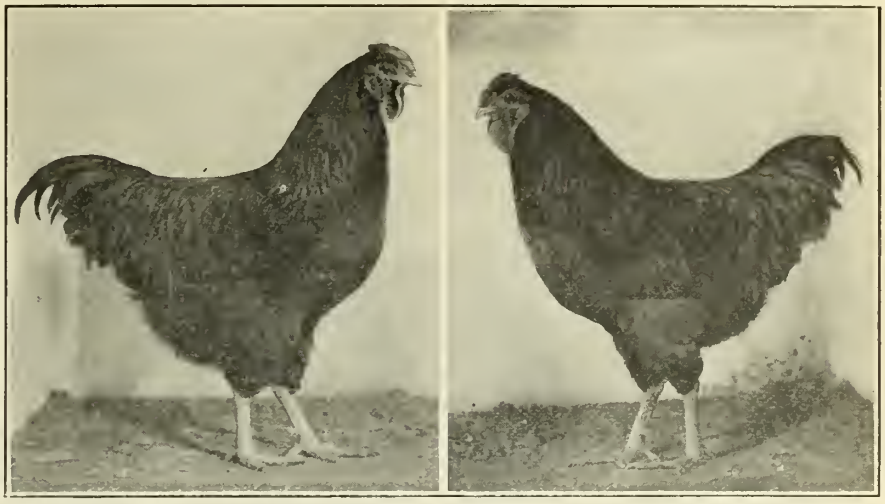


HAROLD TOMPKINS' R. C. RHODE ISLAND RED MALES WINNING AT BOSTON, 1919
Left—cock heading first old pen. Right—cockerel heading first young pen.

the light buff it is always extremely difficult to keep out "mealiness"—produced by the presence of black and white in small quantities. These undesired colors are particularly persistent in the tail and flight feathers. Very few specimens are absolutely free from either white or black. Traces of one or the other almost invariably appear in one or both of these sections.

The best results in any shade of buff or red that is desired are obtained by mating a bird of that shade to one that is just enough darker so that the difference is perceptible—both birds being sound in undercolor. Where the surface is a little weak and uneven, and the undercolor strong and sound, a bird will generally breed according to its undercolor when mated with one of good even surface color. That is, the color in the offspring will be about the same as if the surface in this bird had been of the shade that normally goes with good undercolor — a little richer and darker. Birds that are distinctly lighter or darker than the standard desired should be mated to offset their tendencies, but within tolerably narrow limits. Anything in the nature of an extreme mating is to be avoided except in experimental matings, for while occasionally an extreme mating gives a uniform intermediate shade, it is much more likely to give birds with different shades of color in different sections and also feathers of different shades in the same section.

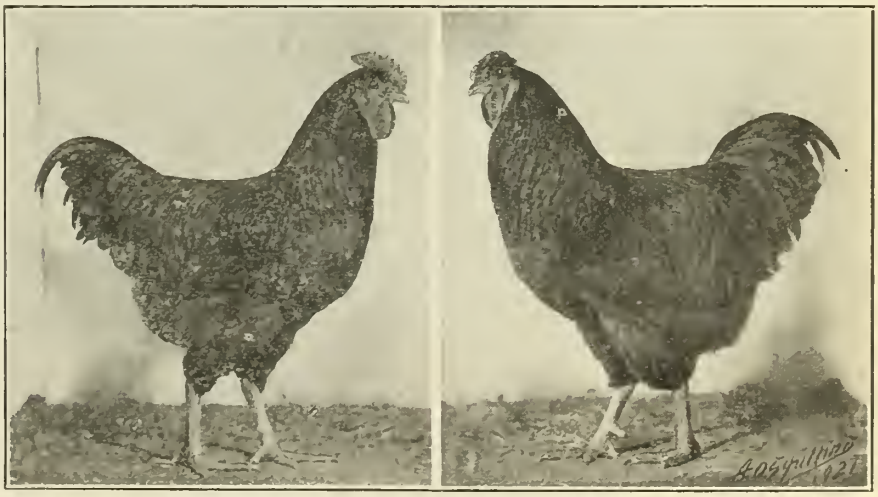
Where a considerable amount of black is required in some sections, as in the tail and wings of the Rhode Island Red, there is generally a strong tendency to slate in the undercolor. In moderation this is not objectionable in breeders, but care should be taken to keep it well under control. In general, the mating of birds with the same fault in the same sections in undercolor—whether white or slate—should be avoided.



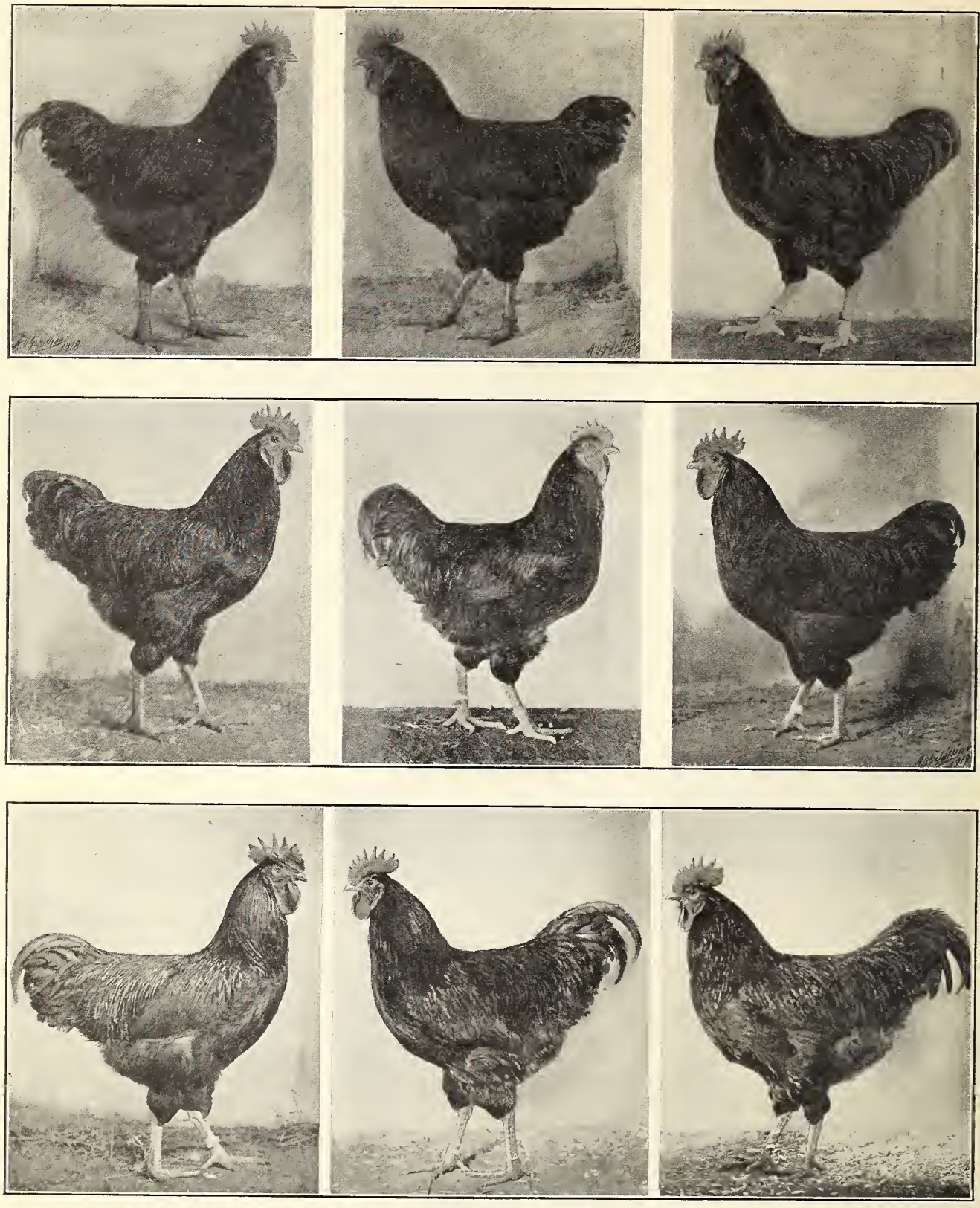
HAROLD TOMPKINS' WINNING R. C. RHODE ISLAND RED MALES, 1921
Left—first cock. Right—first cockerel at Rhode Island Red Club Meet, Rochester, New York.

HAROLD TOMPKINS' WINNING R. C. RHODE ISLAND RED FEMALES, 1919
Left—first pullet; right—first hen at Red Club Meet, Kansas City, Mo.

"Shafting"—the shaft of the feather a lighter color than the web—is more conspicuous in buff and red birds than in any other color and the breeder should work systematically to eliminate it. All faults have to be slowly worked out of the color that has been brought to a pleasing degree of quality, by the constant selection of birds that show the fault in least degree. In the early stages of the development of a color pattern, or in the improvement of stock that is very inferior in color, remarkable progress may be made in a few matings that unite rather extreme types; but when it comes to holding what has been obtained and putting the finish on color, the breeder must have more patience. It is much better to



HAROLD TOMPKINS' WINNERS AT ROCHESTER, N. Y., 1921
Left—second cockerel; right—second pen cock, R. C. Rhode Island Reds.

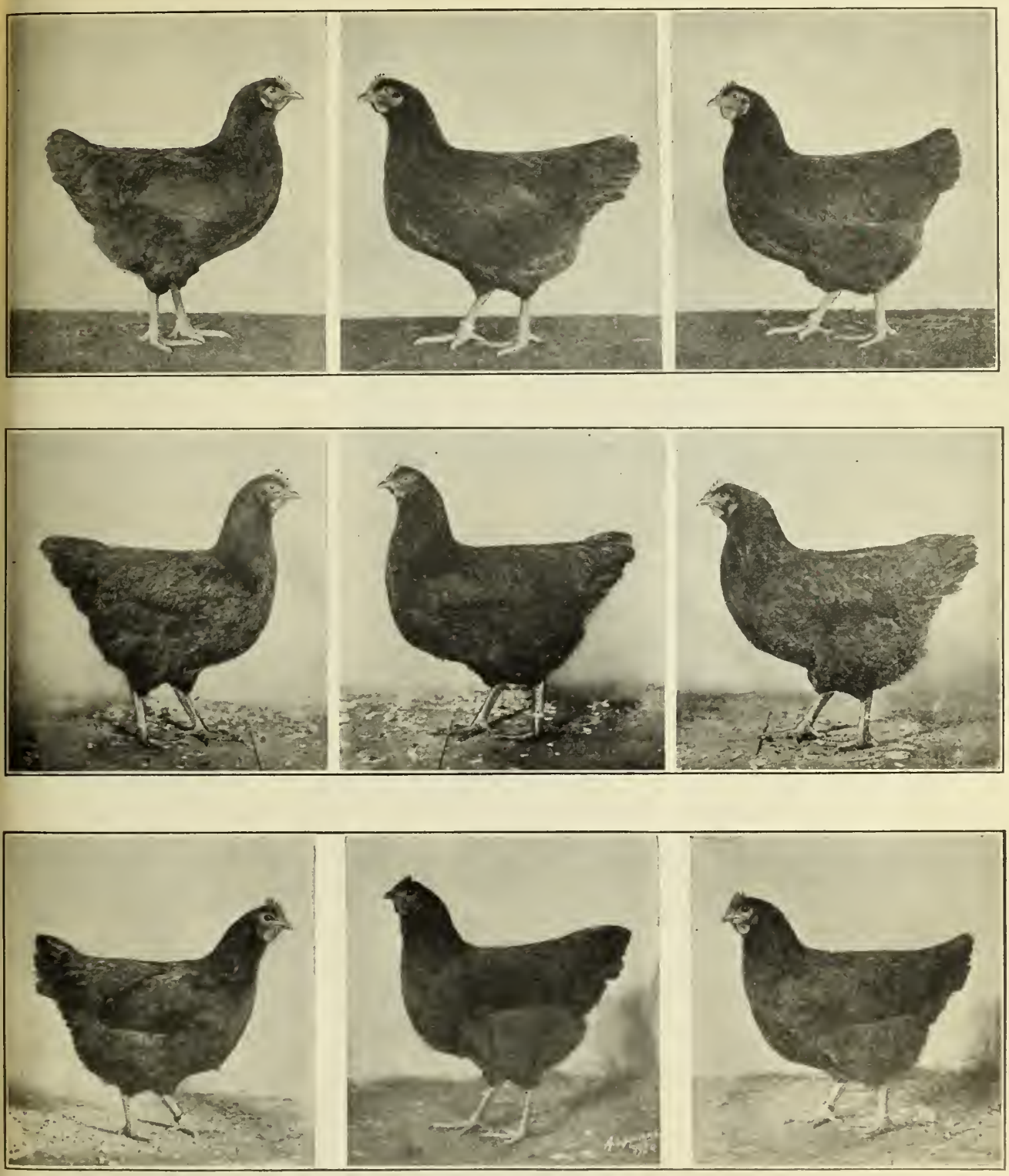


THREE GENERATIONS OF MALES OF THE OWEN FARMS, VINEYARD HAVEN, MASSACHUSETTS, STRAIN OF S. C. RHODE ISLAND REDS

Upper: left—first cockerel Madison Square Garden, 1918, right—second in same class. Center—an unshown bird of the same year. Middle: cock, in center, and two cockerels winning in 1919, the cockerel at the right shown at New York State Fair by a customer, but illustrated here because of his striking resemblance to the other two birds. Lower: left—cockerel heading first young pen at the Garden, 1920; center—a winner at New York State Fair in the fall of that year, right—cockerel heading first young pen at Boston, 1920.

tolerate faults like shafting and mealiness where color is otherwise good until they can be reduced to the minimum by slow selection than to try to remove them quickly. Indeed, efforts to remove them quickly are almost always failures.

When the general tone of buff or red in a stock is too light or too dark, the breeder should mate both sexes of the shades that come nearest to the standard, discarding his lightest or his darkest birds—as the case may be. It is much safer to do this than to attempt to get the result by extreme matings. In all grades of these colors old birds that have held their color well, neither fading badly with exposure, nor becoming lighter in color with each succeeding molt, are the most desirable as breeders. There are not enough of these in most flocks, however, to enable the breeder to dispense with young birds of



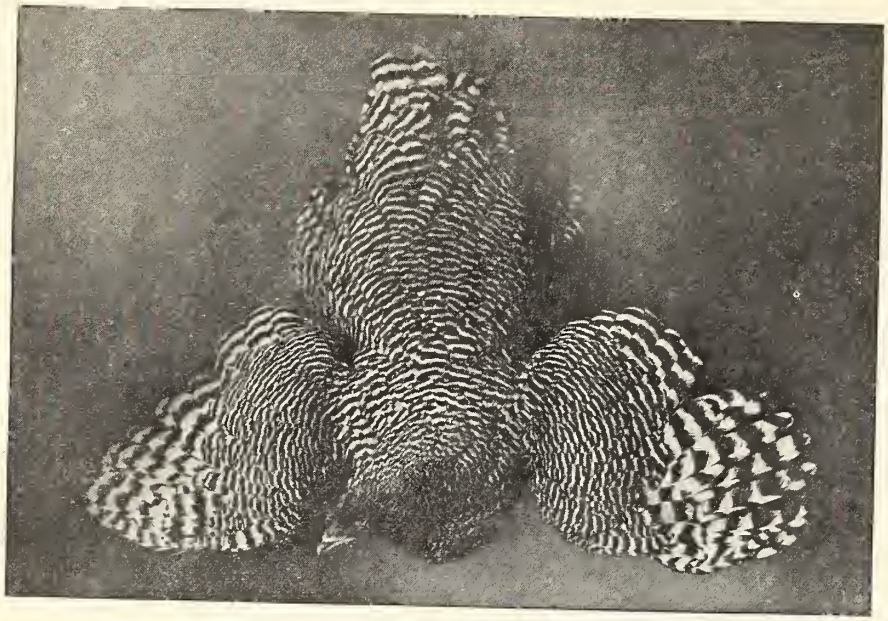
THREE GENERATIONS OF FEMALES OF THE OWEN FARMS, VINEYARD HAVEN, MASSACHUSETTS, STRAIN OF S. C. RHODE ISLAND REDS

Upper: Madison Square Garden and Minneapolis winners, 1918. Middle—three pullets from first young pen at Boston, 1919. Lower: center—first Madison Square Garden pullet, 1920; left and right—winners at Boston, 1920.

good quality in color which has not yet been tested for durability.

Mating the All-Barred Color Pattern

Discussion of this subject treats almost entirely of the Barred Plymouth Rock. Originally the American Dominique and the (Barred) Plymouth Rock had the same color description—"bluish gray ground" with "each feather penciled across with bars of a darker blue." When



A WELL BARRED EXHIBITION BARRED PLYMOUTH ROCK FEMALE

the Dominique almost disappeared while the Plymouth Rock became the most popular of varieties and the color pattern was greatly improved, a difference between them was created, which from the Plymouth Rock breeder's point of view is a crude and inferior type of barring being made standard for the Dominique. The idea underlying this action was really to perfect in the Dominique a somewhat different type of barring held by some of the breeders and standard makers to be peculiarly characteristic of the Dominique as a breed. It was also hoped by those wishing to revive interest in the Dominique that a type of barring less difficult to produce in perfection, and provision for males one or two shades lighter than the females (thus it was thought avoiding double mating) would make the Dominique attractive to those who objected to the rigid requirements in Barred Plymouth Rocks and the systematic double mating necessary in breeding exhibition birds. As far as the history of the development of standards and the development and popularity of different types of fowls affords indications of the probable effects of this policy, it gives no encouragement to the hopes that prompted the policy. The type of barring developed in the Barred Plymouth Rock fixes the standard for other varieties of that pattern if they are to become popular.

The beauty of the barred pattern is in even shades of the two colors all over a bird and in regularity and distinctness of marking in every section, and in the "ringy" effect, also sometimes described as zebra striping, which is secured by uniform barring. Irregularity in barring takes the form of crescentic bars—that is, bars that do not run straight across the feather, and broken bars—that is, bars that do not meet evenly at the quill. Lack of sharpness of definition in barring is caused by muddy coloring both in the ground and in the stripe. Both the lack of contrast in the colors and faults in barring make impossible the sharply defined line between them which heightens the contrast. Some birds have the middle of the white bar quite clean, and the middle of the dark bar sound in color but the edges of the bars mixed in color and not well defined, the color of the dark bar appearing to run into the light ground.

The early Plymouth Rocks had very little barring in undercolor, but since about 1890 practically all well-bred stock has had good underbarring and many birds are quite as well barred in undercolor as on the surface, due allowance being made for the difference in the character of the web. Too much emphasis on underbarring, especially in dark birds, is apt to bring smuttiness in the surface color, and on that account many breeders insist that undercolor is now given undue value. Barring to the skin can of course be carried too far, but no one who can vividly recall the surface faults of Barred Plymouth Rocks when light undercolor with hardly more than a suggestion of barring was common can fail to recognize the importance of keeping the undercolor as near the character and quality of the surface color as can be done and keep the surface colors clean.

Until about 1900 little attention was paid to whether the tips of barred feathers were light or dark. Then it was observed, first in females, that dark tips gave a much more pleasing effect than light ones. In the 1905

WELL DEFINED BARRING ON LARGE FEATHERS

Standard the dark tip was "preferred" in females. Subsequently it was made a requirement in both sexes. Good barring is most difficult to obtain in the wing flights and main tail feathers. The general tendency is to wide, weak and irregular barring, which in the early days of Barred Rock breeding was tolerated as probably the best that could be accomplished in the large, stiff feathers. A good grade of barring in flights and tail feathers is now general in well-bred stocks, and a novice ought not on any account to breed from specimens that are not plainly barred in these sections. The improvement of wing and tail barring is sometimes treated as if it had come as an incidental result of the improvement of barring in other sections and of undercolor, but it can hardly be doubted that most of it has been due to direct selection for as good barring as could be found in the wings. Many breeders gave a great deal of attention to that point, carefully using every bird they could find that had barred wings, and not infrequently these were specimens not particularly good in other sections.

Few topics relating to breeding have been more discussed than the proper verbal description of the color of the Barred Plymouth Rock. In the 1875 Standard it was described as bluish gray, penciled across with bars of a darker blue. There has been endless controversy as to whether the colors actually were blue or gray or only appeared so as a result of the overlapping of the different colors. Many asserted that the colors were (or should be) white and black. The present standard description calls for grayish-white ground and a dark bar that stops short of positive black. This means practically that the black color in the Barred Plymouth Rock must always be a gray black or blue black. Brown black cannot be tolerated because it gives a brownish cast to the surface which is particularly noticeable on the back and wings; nor can the blue black be allowed, by intensification, to reach the stage where it will have a greenish sheen or, going beyond that, show purple. The Barred Plymouth Rock breeder has in addition to breeding for perfection in markings, the task of breeding to perfection of quality in a modified black color. With the light ground the problem is not so difficult, for he does not have to produce a pure white, and slight faults in it do not stand out as conspicuously as they do in the dark color.

The present standard description definitely fixes the general shade of color by its precise definition of the dark color, and makes birds of this variety as dark as they can be and still have the "blue" effect. Double mating is required to produce regularly males and females that can win in good competition, for the mating that produces a male of the standard description will not produce females that match him in color, nor will the mating that produces a standard female produce a male that matches her in color. The two lines as bred to produce the finest exhibition types are kept separate as a rule, though occasionally a breeder who has a bird of one line that he thinks would put a certain improvement in his other line crosses them and then—if he gets what he wants—breeds out the features not wanted just as he would in crossing with another variety, or making an extreme mating for a particular purpose. Only a small proportion of such experiments give anything that can be used, and only an expert breeder thoroughly familiar with the breeding of both lines used can expect to get anything that will make an improvement. The novice and the small breeder need to keep to established lines.

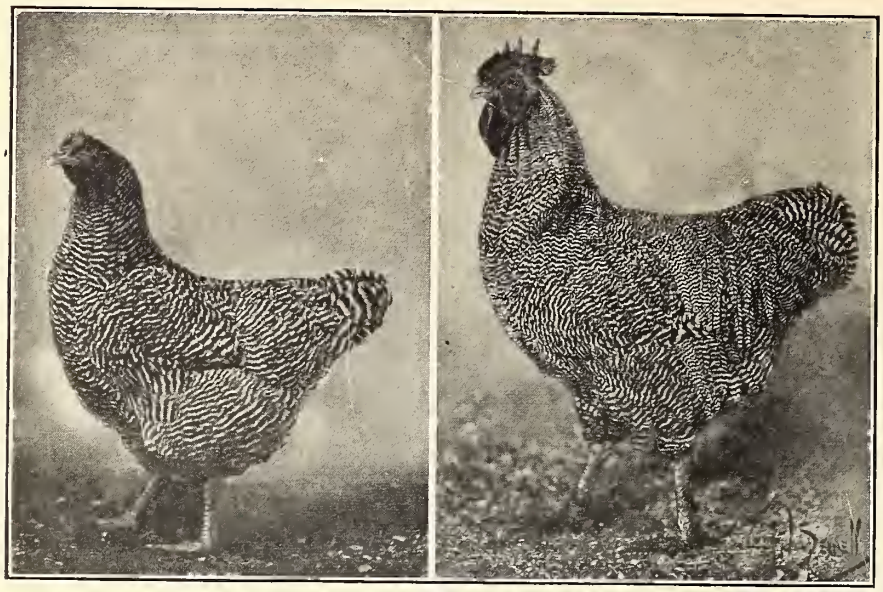
In the instructions for mating to produce exhibition cockerels it must be understood that the females selected must not only have the shade of color required, but must be of the cockerel line. A very dark female of the pullet line might have the color required, or so near it that in

DEFECTIVE BARRED ROCK MALE FEATHERS
Left to right: two fluff; three wing bow; two breast; two hackle.

WELL MARKED BARRED ROCK MALE FEATHERS
Left to right: two hackle; one breast; two fluff; two saddle.

WELL MARKED BARRED ROCK FEMALE FEATHERS
Left to right: two tail coverts; two hackle; three back; two breast.

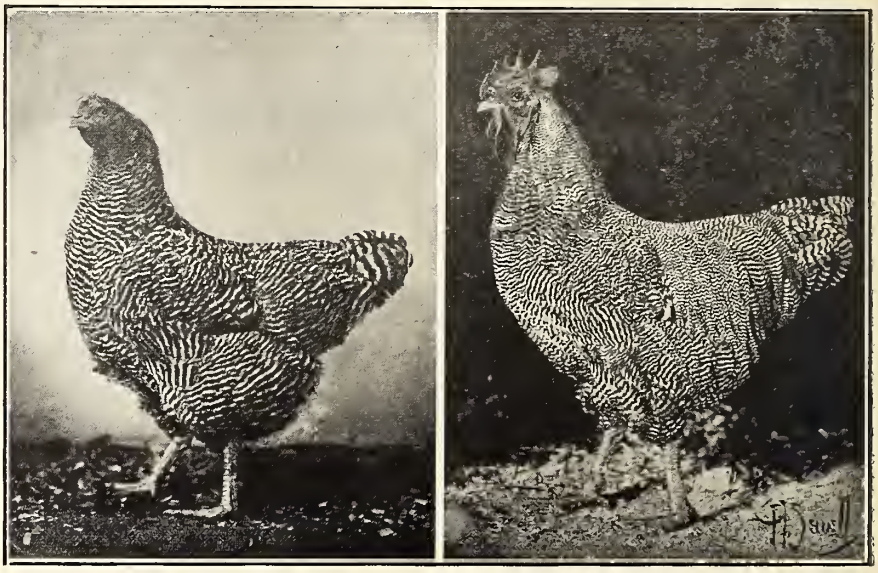
the absence of definite knowledge of her breeding, and of birds known to be of just the right shade to produce exhibition males when mated to a male of standard color, a novice would suppose that she was about right; but unless the right line of breeding is back of the color the

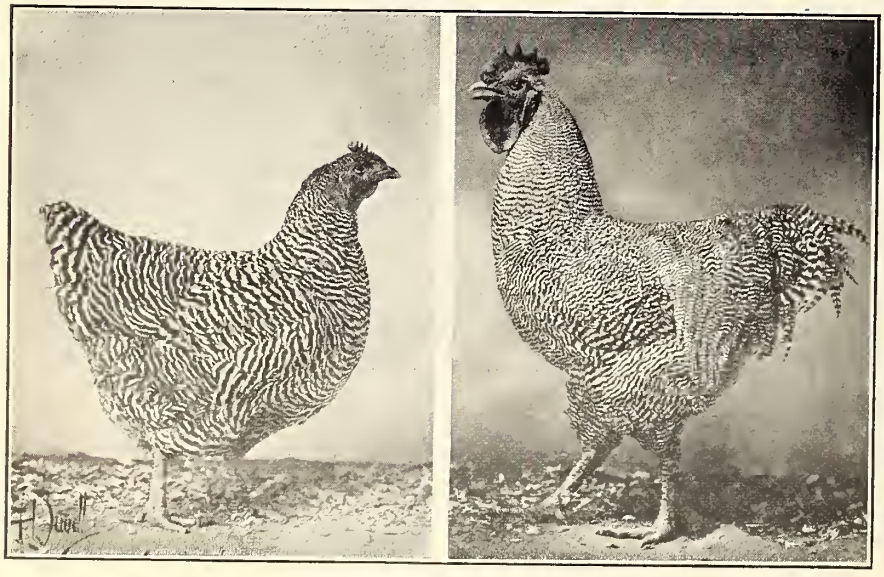


chances of producing standard males are very slim. In the same way, and perhaps more often, a light male of the cockerel line might appear to be a more desirable pullet breeder than a dark male of the pullet line, but if used would almost certainly prove a disappointment—the one chance in a thousand would be that if he proved a remarkably prepotent breeder he might transmit his individual quality without the race qualities not appearing in him. Even then it would take another generation to determine whether his progeny would preserve this characteristic. No breeder can afford to take such chances in matings upon which he is depending for stock. The birds used in regular matings in the double-mating system must be of correct breeding.

In the male line of standard Barred Plymouth Rocks the birds are not by any means all of the exact standard shade of color. They vary just as males in any variety or line do, but the prevailing shade in well-bred stock is very close to the standard description. Some of them may be too light, and some too dark for competition, yet be valuable breeders. Also among the females of this line there are variations. A few may be nearly the shade of the males and these are apt to be the cleanest looking and to give the impression of being better barred, and therefore more desirable breeders than the medium specimens, which are usually a little smudgy looking, or the darkest ones which are often very smutty.

What would be called the standard mating for standard males is of a male of standard shade to a female a shade or two darker. If a male is a little lighter than standard the female must be still darker; if he is darker than standard one of the lighter females should be used. Allowing two shades as the regular normal difference between male and female of the same breeding a range of from four to six shades might be made in compensation matings, but it is not advisable to go farther than this except in experimental matings to test specimens that though too light or too dark for regular breeding operations have some point of merit it is desired to preserve.





The three pairs of birds on this page are Mr. Sewell's selection from his photographs of birds of the "Ringlet strain" of E. B. Thompson, Amenia, N. Y., to illustrate proper matings for Standard color. Upper — medium colored female of the cockerel line, with the darkest Standard male that can be expected to produce males with clean cut barring. Middle—the same female with an exhibition male of a lighter shade. This shows the ordinary difference in shade of male and female in the cockerel-bred line. Lower—Standard exhibition colored female with male of the same line—the reliable mating for producing exhibition pullets.

The standard mating in the female line is of a standard-colored female to a male one or two shades lighter. Females of this line that are a little dark in color should be mated with males a little lighter still, and females that are light in color with as dark males as can be found in this line. The range of shades in these matings should be as above—about four to six shades, unless extraordinary merit in some particular makes it desirable to use birds that fall outside this range of color. These more extreme matings, however, are to be avoided, especially by those who sell stock and eggs for hatching. The closer they can keep to standard color in both male and female lines the more satisfactory buyers will find their stock, and the less complaint there will be of the evils of the double-mating system.

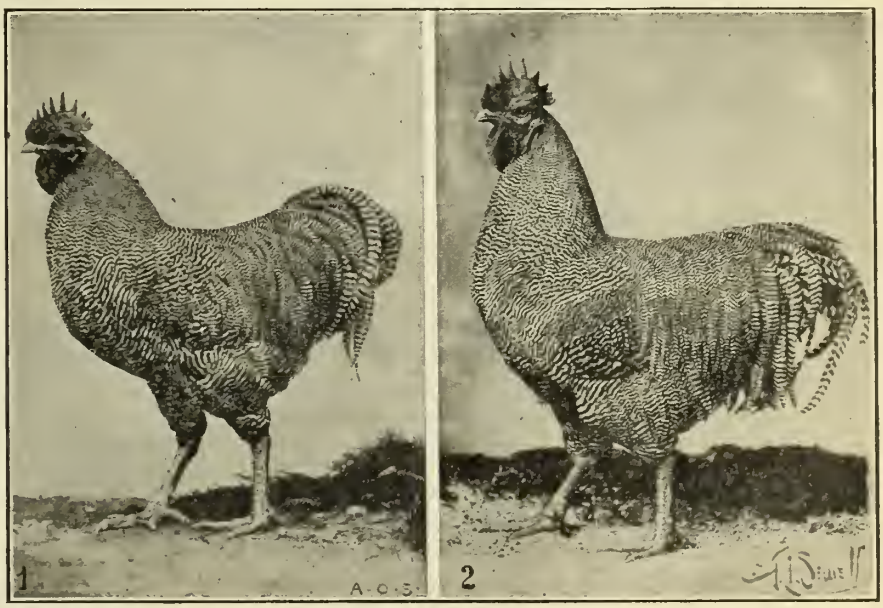
"RINGLET STRAIN" STANDARD EXHIBITION BARRED ROCKS
First hen and first cock at Madison Square Garden, 1919.

In considering the shade of color attention should be given to all sections, and the birds that are most uniform in shade in all sections, provided they come within a few shades of the standard color, should be preferred to those that are of different shades in different sections even though in some of these sections their color is perfect. While considering the shade of color in its general effects the breeder must also give the most careful attention to details of barring. Not only should the barring be good in all the details mentioned in preceding paragraphs, but the male and female mated should have the same character of barring. A fine and a coarse-barred bird should not be mated if uniform offspring are desired. For experimental purposes an extremely dark or extremely light specimen of either line that is distinctly barred is often valuable and stock from it may eventually be of great help to a breeder. Thus some very light males and some very dark females are remarkable for the character of their barring, the edges of the dark bar showing fine and straight though faint because of the lack of contrast in the light and dark colors.

Those who can breed only one line of Barred Plymouth Rocks will get the most satisfaction by breeding the female line and breeding from the darkest males of that line as far as they can do so without getting their females too dark. While the lines as bred to produce standard exhibition and breeding stock must be kept separate, it is entirely possible by selection within each line to change its color to that of the other. If one is breeding to the Standard it is a matter of policy to have the birds of one sex of standard color. To get both a little off leaves one without opportunity to sell stock at good prices at all. For those who may wish to experiment in that direction breeding to hold both sexes in the same line as close to the standard color as possible is an interesting problem. When we see the remarkable things that have been accomplished by selection in breeding we cannot regard the production of Barred Rocks of the same shade of color from the same line of matings as undoubtedly impossible. Frankly recognizing the difficulty of it, the progress that has been made in this color and in other things once regarded as impossible still suggests that eventually some master breeder may strike a combination that will change the whole status of the case.

Mating for Mottled and Spangled Color Patterns

The simplest of the color patterns of fowls is the partially and irregularly mottled black of the Houdan and



"RINGLET STRAIN" BARRED ROCK MALE WITH REMARKABLY PROFUSE PLUMAGE

Fourth Garden cockerel, 1917. At the left he appears in his cockerel form as photographed by Mr. Schilling in the summer of 1917. At the right he is shown as photographed by Mr. Sewell in the summer of 1918. To the student of breeding his novel development of plumage is interesting, showing how breeding for extra good furnishing in males will occasionally produce a superabundance.

Ancona. In this there is an occasional white tip on black feathers. The present standard calls for the white tip on about one feather in five except on the back where the proportion should be about one in ten. The point, however, is not to get any definite proportion of the feathers tipped, but to have an even distribution of the small white tips in the surface plumage. On the back where the feathers are short and lie very close and flat the tips must be less frequent or the spots will be closer together than in the rest of the plumage and the back will appear lighter in color than the rest of the bird. The standard does not specify any particular shape of tip. In Anconas the breeders, going in advance of the written standard, but acting in accordance with the general principles of design in the color patterns of fowls, are making the tips V-shaped, like the spangles of the Spangled Hamburg, but much smaller. In the Houdan the V-shape is perhaps not so much insisted upon, yet it is quite prevalent.

SILVER SPANGLED HAMBURG FEMALE
Showing the Wing Pattern.

Gray tips of irregular form are common and make a poor effect. The general tendency is for the tips to increase in number, size and clearness of color with age, and when mating the breeder must make allowance for this, especially when considering young birds. A cockerel that is almost black may be mottled just about as wanted after his first adult molt. The problems of breeding the black color are precisely the same as in solid black except in respect to the appearance of white. In the solid-colored bird that is prohibited; in the mottled a certain amount of it is demanded.

In the spangled varieties the general color pattern is the same as in the mottled, but with the light and dark colors reversed and with the markings on every feather. The ground colors in these varieties are white and various shades of red—ranging in different varieties through buff to brown. In the Silver and Golden Spangled Hamburgs the spangles are V-shaped, the point of the V being away from the tip of the feather and the wide part being rounded—conforming partly to the outline of the feather. The spangles are also much larger than the tips in the plumage of the black mottled varieties. The pattern is most attractive when the spangles are of medium size and distinctly separated on the surface. When the spangles are too large they run together and give the effect of a black with an irregular lacing of the ground color.

The pattern is seen at its best in the Silver Spangled Hamburg, the spangles being much more conspicuous on a white ground. In the little known and very dark colored Redcap the spangles are the shape of a half moon. These varieties must be systematically bred on different lines to produce the same character and quality of markings in male and female, the tendency being for the males to run lighter in color just as in the Barred Rocks. The principle on which these matings are made is the same—a standard-colored male to heavily spangled females, which must be of the same line of breeding; and a standard female to more lightly marked males, which must be of the same line of breeding.

In the Speckled Sussex and Mille Fleur Bantam the spangling is double, with the white spangle smaller and at the tip of the feather, though the Standard describes the black spangle as a bar dividing the white from the reddish-brown or buff ground of the feather. In the neck hackles, back and saddle plumage of the males the black spangle or bar becomes a stripe with a white tip. In both these varieties the quality of the color of the ground must be bred as carefully as if the birds were of solid color, and in addition the breeder must select for clear and distinct markings in all sections.

Mating for the Ermine or "Columbian" Color Pattern

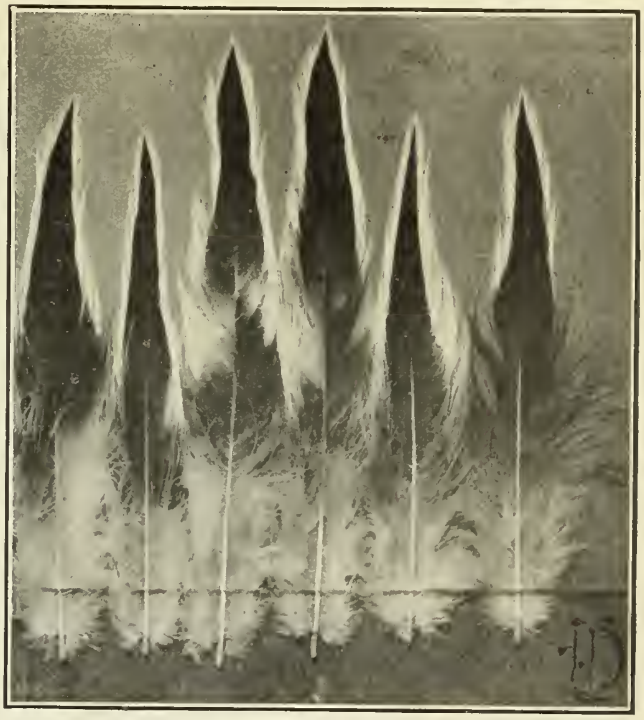
This is the pattern of the Light Brahma, Columbian Wyandotte and Plymouth Rock, and Light Sussex. Two distinct types of this pattern may be recognized as perhaps equally attractive, preference for one over the other being a matter of taste. In the first type, which is the type that was most in favor when the Light Brahma was the only standard variety with this pattern, the idea was to have a white bird with black striping in the hackle, and black tail with coverts laced with white. In such a bird the wings would normally contain a great deal of black, but the early ideal was to have the black in wing a secondary consideration. It was not desired to show at all when the wing was folded, the specifications for color were made to secure this effect, and beyond that requirements were at first indefinite. It was not until the latter days of the first long period of popularity of the Light Brahma when surface points had been brought to a rare degree of perfection, and the decisions in close competition often had to be determined upon points previously regarded as of minor importance, that breeders of Light Brahmas began to pay particular at-

WING OF A LIGHT BRAHMA
Showing Strong Black Pigmentation.

tention to the wings. Then the demand was for more and more black in the wing.

With the increase of black in the wings, and especially because of the effort many breeders made to get in the wings of females as much black as in the wings of the males that were best in this section, a more heavily pigmented pattern was gradually developed with striped saddles in the males, a great deal of slate in the undercolor, and a decided tendency for the black to encroach upon the white in the surface color in all white sections. Some of the males in this type were strikingly attractive, a well-marked bird having a rich color effect though the white surface was perhaps nowhere a pure white, and the outcropping of black at the shoulders and on the thighs and fluff—which were sometimes quite distinctly penciled—could not be regarded as anything but faulty. But the females of the line of breeding which produced this type of male almost invariably had very smutty backs, even the best of them requiring an amount of plucking before they could be put into competition that gave the backs, which ought to be perfectly smooth in surface, a very ragged look. The reaction from this extreme type went just far enough to avoid its worst faults. The influence of the breeders of Columbian Wyandottes which were rapidly coming into popularity when the Light Brahmas were at their lowest stage of public favor was the strongest factor in fostering the development of the darker type and in fixing the present style. The early Columbian Wyandottes were very poor in color, and those who worked to improve color in them naturally sought to get a striking effect as quickly as possible, and this was accomplished by giving more attention to contrast in colors than to finish in the pattern.

The old-school Light Brahma breeders generally looked at the color problem in this pattern from a different point of view than that of the breeders of Columbian Wyandottes, who took up the problem at a more advanced stage in the development of standards. When the old Light Brahma color pattern was perfected breeders were paying no more attention to undercolor, or to any point that did not show as the bird stood on the ground or in the exhibition coop, than experience taught them was necessary to preserve the surface qualities they valued. Their attention was given first to making the variety white where the Standard called for white, a sound black where the Standard called for black, and then to securing perfect striping in the hackle and perfect lacing in the tail coverts. The Columbian Wyandotte and Plymouth Rock breeders aimed for the uniform improvement of all sections in accordance with modern ideas of the use of the Standard, which attached as much importance to securing a perfect wing as to securing perfect striping in the hackle. Indeed, most breeders of Columbians have seemed to be more intent upon getting perfect standard



ERMINE COLOR MALE HACKLE FEATHERS
This group shows common irregularities of marking in a neck that looks very good from the outside.

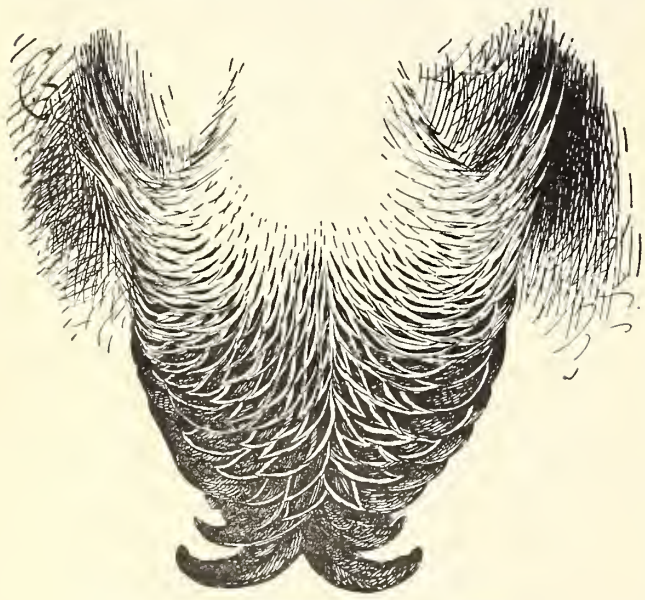
wings—and more vain of their achievements in that line—than upon getting finish in the surface sections.

The objection to breeding for a wing with as much black in it as the Standard calls for as the prime point in breeding this pattern is, that with a wing as black as that there is apt to be so much black pigment in other sections that clean white surface color necessary to define markings sharply is not obtained. That there is no necessary close correlation between the quality of markings in different sections is easily apparent to anyone who will carefully examine the results of mating birds of this pattern that are uncommonly good in one or more sections with birds that are poor in those sections. The general quality of the black color is usually nearly the same in all sections, except that the black in the wing will not show purple barring when the black in the tail does. But there is no regularity of correlation between the extent of the black in the wing and good striping in the hackle or nice lacing on the coverts, or between good wings in which the flights are all black but a narrow white edging on the lower webs, and good main

A CORRECT AND A DEFECTIVE PRIMARY FEATHER OF THE LIGHT BRAHMA, THE COLUMBIAN PLYMOUTH ROCK AND THE COLUMBIAN WYANDOTTE

tails which are all black; or even between good hackles and good tail coverts. Where good quality in all is obtained it is by systematic selection for all points; and where so many points are to be considered, the practical question is whether it is better to try to get all simultaneously or to develop the most conspicuous points first.

The modern school of breeders generally follow the former-named method; the old school took the other course. They fixed hackle first, then tail coverts, then wing, and while going as far as practical in making standard wings, would not mate to increase the black in the wing when that was likely to bring out more black than was desired on the surface. From the Standard viewpoint the wings of well-bred stock of the Columbian varieties are as good as the wings of Light Brahmas generally, when that variety was most popular and its classes at the big shows most attractive, but the surface sections lack much of being so; and to anyone who carefully analyzes the changes in the popularity of varieties, that appears as the reason the Columbian varieties have not obtained wider popularity. The greatest pleasure that the great majority of breeders of a few standard fowls get out of them is the pleasure of looking at the birds in the yard, and of seeing the beauty of those birds attract all who see them; and breeders who can make only one or two matings cannot make much headway breeding for good surface points and as black wings as are now in style. The best policy for a beginner or for anyone limited to a few matings and relatively small numbers of chickens each year is to follow the old plan of breeding for surface points first.



IDEAL LIGHT BRAHMA TAIL COVERTS

The common faults in the hackle are smuttiness of the white edge of the feather, the point of the stripe extending clear to the tip of the feather, the "breaking" of the black stripe in the undercolor just under the surface, and a lack of intensity of the color in the black stripe. In the last Standard revision the description of the hackle in this and some other color patterns was changed to omit the word "stripe" and make a description corresponding to that of the tail coverts, which are described as "edged with white." When the stripe runs through to the tip, or the white edge does not extend around the tip, the neck appears slightly smutty even if the line between black and white is clean cut. When the edge is not clean cut and the white has fine streaks of black, the neck will be smutty.

All the beauty in this section in the surface comes from clean colors, sharply defined, with the edge of white the same width around the tip of the feather as elsewhere. The stripe in the males, with their narrow hackle feathers, is narrower than in females of the same breeding. Hence, if we breed for a wide stripe in males, we will soon get wider hackle feathers in the males, and very wide hackle feathers in the females, which are not only commonly smutty, but are apt to make a rough looking neck—the wide feathers not giving as smooth a contour as those of medium width. In fact, the character of wide feathering in this section is a common accompaniment of coarseness in all parts.

The "break" as it is called, in color in a hackle feather is a failure of the stripe to carry well to the butt of the feather and is a common feature even in birds of good breeding, and in spite of the persistent efforts of breeders to get rid of it. The really serious and objectionable thing about the "break" is not its existence, but its tendency to come out in the open leaving the stripe shorter than the exposed part of the feather. Experienced breeders are not generally severe on this break when selecting breeders unless it is too close to the surface. The thing to be carefully avoided is the mating of two birds in which it is close to the surface with a possible tendency to come out. The break is really a tendency to barring, as we shall see when it is considered in the saddle section.

"Finish" in the tail section in this pattern is principally a matter of well-marked tail coverts. The problem is to get these black with as narrow a white edging as will show distinctly, and keep black entirely out of the cushion and back of the female, and limit it to a little striping in the saddle of the male. The breeder must recognize that with the general tendency for the patterns of differently marked sections to merge at the junction of the sections he cannot expect to produce many birds that can go into strong competition without some removals of mismarked feathers in this section. In mating birds, however, he must consider them just as they were produced. He must try to get them as clean as possible here, but make allowance for the difficulties of doing so. It is easier to get males that are fairly good here than females, because a little black in the saddle of the male can be given the form of striping or regular ticking which in the eyes of most people gives more character to the section, while a corresponding amount of black in the female cannot be given any regular form that will be attractive. In trying to keep the saddle clean in females, the breeder is apt to get a wide and uneven edging on the black tail coverts, while if he breeds for strength in these he is likely to get a good deal of irregular black in the cushion.

In the males the Standard now calls for a V-shaped stripe in the saddle feathers at the base of the tail. The "break" in the V-shaped stripe corresponds to the break in the hackle, and is closely associated with the character of the black in this section in females. Males that are strong in color usually carry rather stronger markings in this section than appear to be called for by a literal interpretation of the Standard. Such males with nicely edged smaller coverts mated to females that are quite clean in the cushion and a little weak in covert lacing—the edge

a little too wide to show the pattern at its best—will usually give a goodly proportion of the offspring of both sexes well marked in this section.

Males that are a little weak in this section with striping in saddle faint should be mated to females that with well-marked tail coverts have much more black in the cushion—and in the undercolor generally—than can be

STRONGLY MARKED LIGHT BRAHMA MALE
SADDLE FEATHERS

taken out of the back in preparing a bird for show without leaving a good deal of dark undercolor exposed. Often a hen that had this character as a pullet will as a hen be quite free from black in the surface of the cushion and back without having lost anything in the coverts, which may even be improved by a little widening of the white edge which in some of the birds of this kind is too narrow to show distinctly except upon close inspection. In using females of this type the male to be especially avoided is the one with a good pronounced stripe in the saddle that does not break into the V-shape on the surface, but has a solid, wide base with the black in the surface tending to blend with that in the undercolor.

It is in this tendency of the V-shaped stripe in the saddle to "mix up," as it were, with the undercolor, in which a medium amount of black seems always to have a tendency to take the form of a bar just inside the surface, that we see the explanation of the persistence of the break in the striping of the hackle. The V-shaped stripe in the saddle is an innovation introduced at the 1915 revision of the Standard. It appears to be due to the fact that the production, or tolerance of a dark bar in undercolor is incompatible with the maintenance of a good stripe on the surface of the same feather. A "break" has to come in some form.

In mating for both neck and tail sections in this pattern birds that are in both sexes very close to the standard often give remarkably good results. The mating of a standard bird of one sex with one a little bit stronger in all important sections (allowance in both being made for age) is the ideal mating—provided that no common weakness is found in them. The tendency for birds of the same line to have the same weakness is what prevents the wider use of what is practically a mating of standard birds of both sexes. Most birds—however near the standard—have some fault that makes it expedient to mate them with a bird not quite as good in general quality, but strong where they are weak.

In considering the wings in mating it is a good plan for the breeder who is limited as to the number of matings he can make, to follow the practice recommended on page 135, of exercising especially rigid selection in the males and being a little more lenient with weakness in the wing in females. By always using males with standard wings some weakness in the female wing can be allowed without danger that the wings will become poor. The allowance, however, should be in respect to the area of black—tolerating some white in flights—not in using birds in which the black is very inferior in quality.

In breeding fowls to the Standard it is of course desirable to keep as close to it in all sections as practical, but as has been said before, the Standard is not unreasonable and it is not good policy to make too much of a fad of the standard wing while the surface sections are far short of perfection in standard quality. The one place where white in a black section is most unsightly is at the base of the tail. There are few males two years old that do not show some white in the main tail feathers and at the base of the sickles. Young birds with this fault should be remarkably good otherwise to be used. In old birds breeders have to tolerate a little of it, but need to keep it carefully under control.

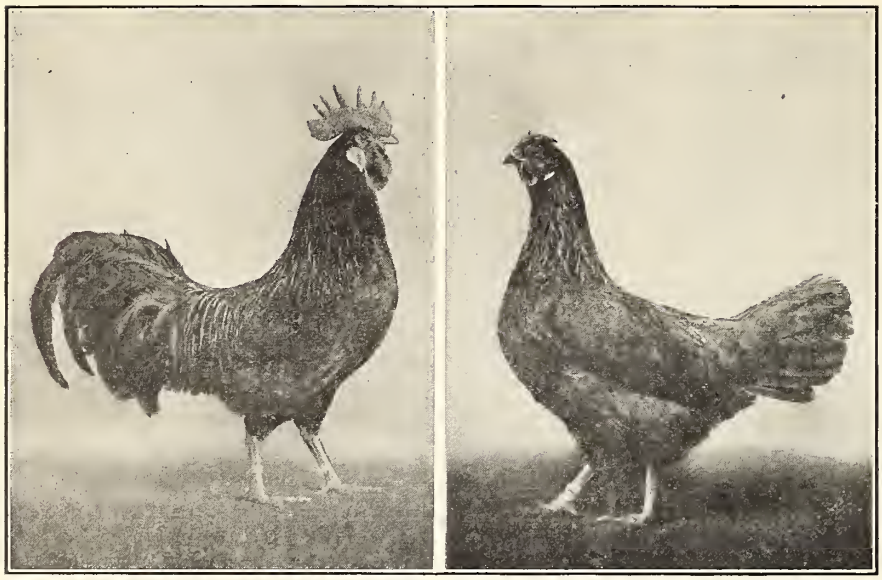
As a rule, breeders of this color pattern do not have much trouble with brassiness in well-bred stock, but where selection for good white has been neglected the males are sometimes quite yellow on the backs. Most stock of this color will also occasionally produce birds with one or more reddish splashes in feathers, and perhaps with a feather that is all mottled with yellow or red. Some of the Columbian stock does not have to go many generations back to get these red feathers, but they come occasionally in Light Brahmas in which the ancestral taint must be remote.

Mating Stippled, Penciled, Laced and Partially Barred Colors

The varieties that are grouped together in this section are in nearly every case duplicated in the silver and golden color patterns—that is, they have been bred with the dark markings in one case on a white ground. and in the other case on a buff or bay ground. Most of them are complex patterns, presenting the features of two or more of the patterns which have already been discussed and, in addition, in many of them the males and females have different color patterns.

In the Brown Leghorn, Silver Leghorn and Silver Gray Dorking the males have black breasts and bodies with the neck and back of the Brown Leghorn red and of the other two white, with more or less striping of the character of that of the males in the ermine color pattern. The brown female has a light brown ground color stippled with darker brown, the others white ground color stippled with gray. Both types of females have reddish or salmon breasts, the tone of the breast color in either case being modified by the ground color of the

bird. The wings and tails in both sexes in all these varieties have black in nearly the same pattern as the black in these sections in the ermine colored varieties. It should be said, however, of the striping in the backs and saddles of the males that it is not as universally present in good form, and in some males is quite lacking even when the color is good in other respects. Such absence of striping, though accounted a fault, is neither as conspicuous nor as serious as it would be in the ermine color pattern in which it is a prime feature. In the Silver Gray Dorking male the striping is almost entirely absent. A little of it is tolerated, but it is not regarded as desirable. The omission or reduction of striping simplifies the problem of breeding and reduces the amount of double mating necessary to keep both male and female at the highest pitch of standard quality.



DARK BROWN LEGHORN MALE AND FEMALE
Showing very dark birds.

The primary points in breeding color in Brown Leghorn males are to get good black in the black sections, and a rich, dark, brilliant red of the same shade in neck hackle, back and saddle, with the neck and saddle feathers striped with black. The breeder of Brown Leghorn males has to produce the body color of a black fowl, the top color of a red one, and as far as possible with these the markings of the ermine color pattern. The result is obtained by breeding males of standard color to the type of color in females which when mated with a standard-colored male will reproduce its color. This is a female much darker in color than the beautifully stippled soft brown female and not well stippled—the stippling too heavy to look clean. In some respects the rule given in a preceding section, that the appearance of the bird should come first in considering its value for breeding, fails when applied to color patterns that differ in the sexes. Where the male and female are not directly comparable in a single color feature the problems of mating become in a greater measure dependent on knowledge of ancestry — particularly knowledge of the color characteristics of birds which may not be present or available for comparison.

The breeder mating varieties in which the sexes have different color patterns has to consider the value of the male as a producer of females in terms of his dam and sisters, and the value of a female as a producer of males in terms of her sire and brothers. He must learn to recognize in a certain combination of color characteristics in one sex the corresponding combination in the other sex. The problem is not essentially different from the consideration of ancestry in any problem of mating, but the invisible factors are here of first importance while in other cases they are only secondary. Here the entire color contribution of an individual of one sex to its offspring of the other sex has to be judged not by the bird itself, but by its relatives of the opposite sex.

Successful mating under such conditions depends not merely upon the breeder's faculty of seeing the quality of the complementary color in the bird he is considering, but upon thorough knowledge of the stock for several generations back. A good breeder could take unknown stock of any variety in which the sexes are alike in color and establish a strain with such peculiarities as he desired in less time than it would take him to get sufficiently familiar with unknown stock of a variety in which the sexes differ in color to begin to make his matings with as much assurance of getting the results sought as he would have in the other case from the start. The greater complexity of the patterns where the sexes differ in color also tends to reduce the proportions of really desirable

DARK BROWN LEGHORN MALE AND FEMALE
Showing medium dark birds.

breeding birds secured in the earlier stages of the development of a line or strain.

In mating Silver Leghorn males the same conditions obtain, but to get attractive specimens more attention must be given to striping, for in this color striping gives the character to the bird just as it does on a Light Brahma. While as has been said, consideration of the

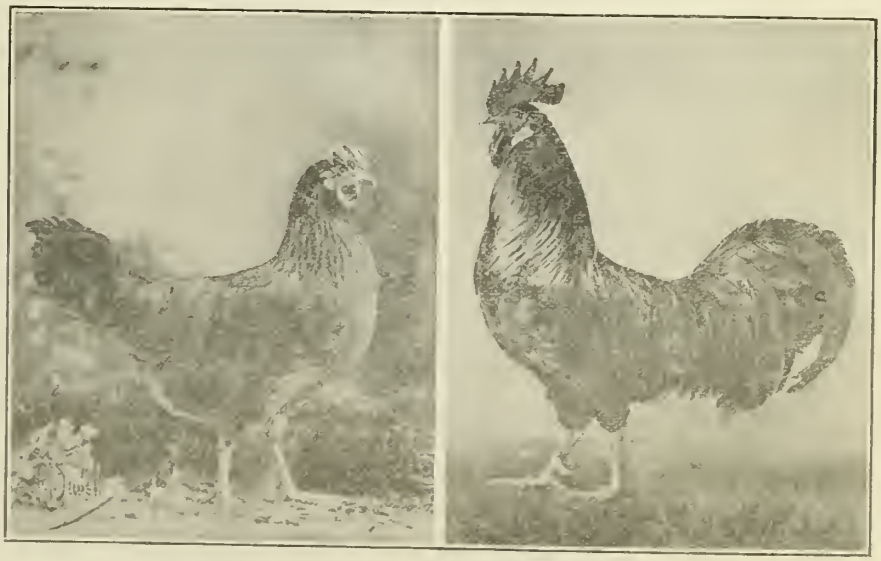
LIGHT BROWN LEGHORN MALE AND FEMALE
Showing medium light birds.

females in this mating must dwell much on what their nearest male kin have been, there are some features of importance quite plainly distinguishable in the bird itself. Most important of these is the character of the striping in the neck hackle. Good striping in both male and female may be expected to produce good striping in the offspring. The principal thing however, in breeding under these conditions is to know how the line produces.

The stylish modern Brown Leghorn female is an even "seal brown" on the back, the shade being produced by having both light and dark colors of harmonious shades, the stippling fine and even, and the plumage free from shafting. Too much red in the brown gives a harsh reddish brown, while weakness of pigment gives ashy, grayish-looking plumage. A decidedly yellowish or golden tinge of brown was once much in favor but has long been discarded in highly bred stocks. On the body the brown color is usually a little lighter. The breast should be a delicate (not a strong) salmon color—richest at the front and center and lighter at the sides and lower part. The black of the wings is modified to a slaty brown. The main tail is a dull black with stippling on the highest feathers. The neck is a golden yellow with black stripe in the hackle, and in front—above the breast—a rich salmon. With considerable variety in colors in some of the different sections there is everywhere in the standard female softness of coloring, while in the standard male the characterisitc is strength and uniformity of color in the red and strength and distinctness in the black. The male that mated with a standard female produces standard females of superior quality is much lighter than the standard-colored male. He is light red in the neck and back and his black breast and body are more or less frosted with red. His hackle and saddle striping is light, often indistinct, and sometimes entirely lacking. Most breeders of high-class Brown Leghorn females try to keep the males of their pullet breeding line as free from weakness from the male standard viewpoint as is consistent with the production of good color in females. A few breed entirely by pedigree and results on the female side. This policy seems to lead generally to the appearance in the females of faults corresponding to the weakness allowed in the males. That, in fact, is the inevitable result of breeding by pedigree and performance in any direction without taking account of the appearance of the individual. Where a little attention is given to the selection of males for fairly good black breasts and uniform top color some very attractive males are produced in the pullet line.

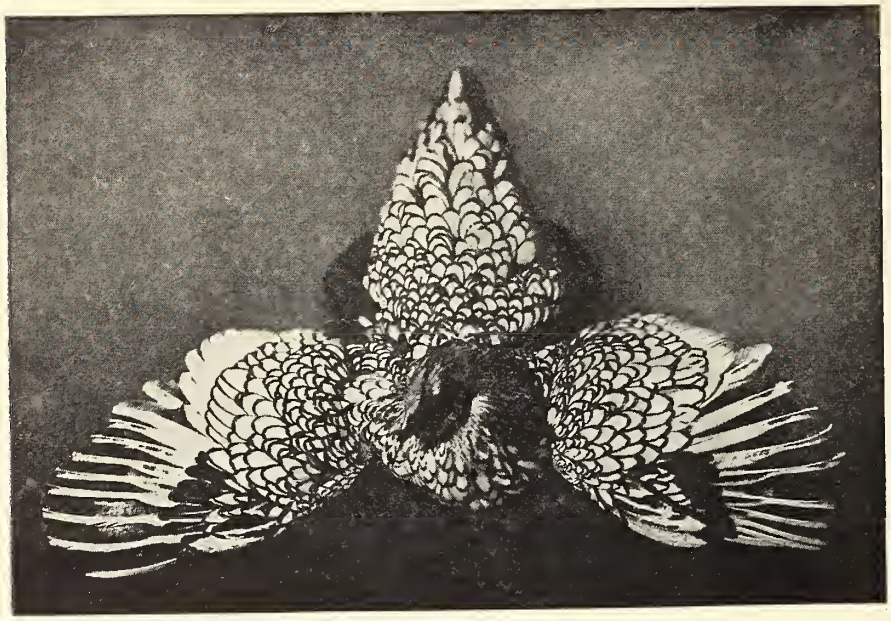
In the Silver Gray Dorking we have practically the silver type corresponding to the pullet line of Brown Leghorns. A novice who wants to breed Brown Leghorns, or any other variety that requires double mating, will usually find it most satisfactory to breed the pullet line, keeping the males as dark as possible without sacrificing the color of the females. Or if he likes the general color of the Brown Leghorn female, does not go in for competition, and is not particular about getting the correct shade of seal brown, and maintaining delicate shading elsewhere, he may produce females with more of the red cast than is wanted and good-looking, medium-colored males.

In the Dark Brahmas, and Silver Penciled Wyandottes and Plymouth Rocks, we have in the males the same character of markings as in the Silver Leghorns,



LIGHT BROWN LEGHORN MALE AND FEMALE
Showing the lightest color in favor with breeders.

but the females penciled throughout—the ground being gray. And in the Partridge Cochin, and Partridge Wyandotte and Plymouth Rock we have the same combination in the males as in the Brown Leghorn, while the females are penciled throughout—the ground being bay or brown with pencilings a darker brown or black. Again systematic double mating is necessary to produce standard specimens of both sexes, and the method of mating duplicates that for the stippled pattern. The matings that produce standard males give females too dark in color to be attractive unless—as occasionally happens—they are phenomenally clear in penciling.

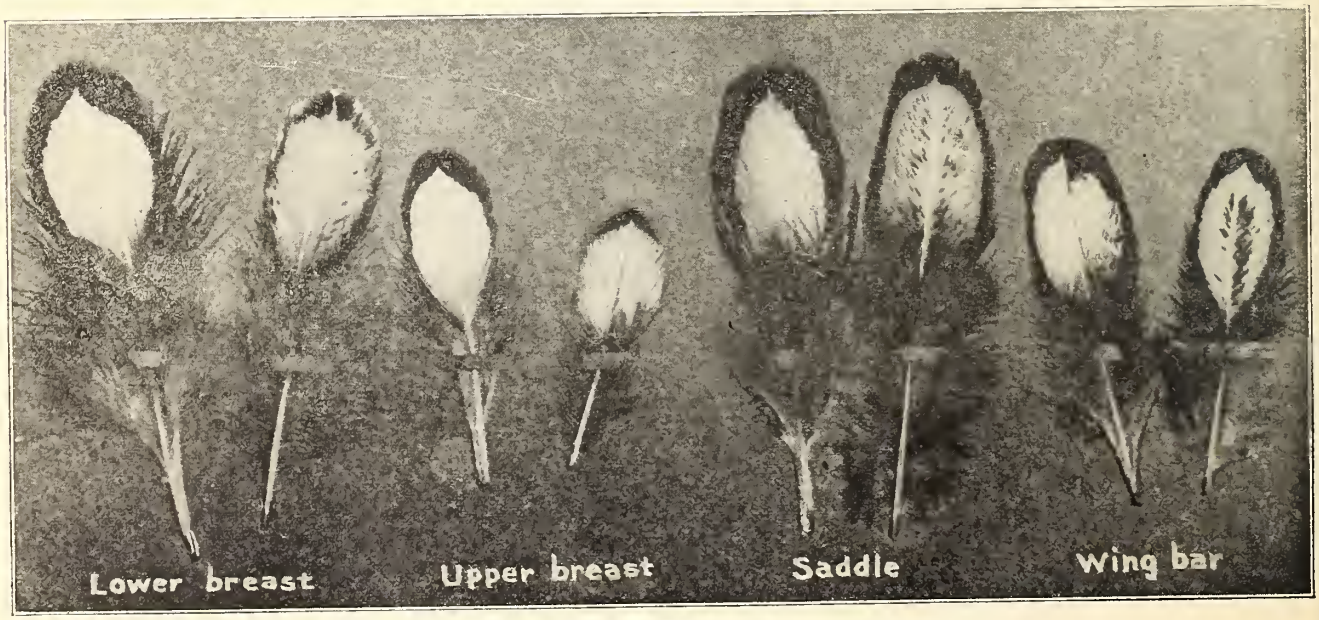


WELL MARKED BACK AND WINGS OF SILVER LACED WYANDOTTE FEMALE

Although the pattern appears more intricate, definite triple lacings on each feather of the body being required, the fact that the pattern and colors are the same in all sections slightly simplifies the matter for the breeder. The novice will make most satisfactory progress breeding any of these varieties if he breeds the female line until he feels that he has fairly mastered handling color in it before undertaking to breed the two lines simultaneously. The beauty of a female in this pattern is distinct and regular penciling on a clean ground of white, or bay or light brown, as the case may be. The most common faults of the pattern are defective and irregular penciling, differences in the character of the penciling in different sections, and—in the silver or gray varieties—a reddish tinge in the dark pencilings. The method of obtaining uniformity in penciling is to mate for as good markings as can be obtained in every section. Some birds are extra good in one section and poor in some other section.

In general there is a tendency for the penciling to be lighter on the breast than on the back. Hence the greatest uniformity is more easily secured by breeding to get the pencilings as distinct as possible and the colors clean in all sections, so that slight differences in the width of the pencilings are not observed. If the penciling is good enough its excellence will so attract attention that the fact that it is a little heavier in one section than in another is not noticeable. But if the penciling is not clearly defined, and neither the ground color nor the color of the pencilings clean, the differences in the sections are exaggerated. Thus we sometimes see a bird which has the breast faded looking while the back is quite smutty, and the fact that in neither section are the markings clear cut gives full effect to the difference, when if the same amount of color in each section was present in clean penciling the bird would have only one fault where in the first case it has three.

The tendency to heavier markings and darker color on the back, while common, is not absolute. As has been stated again and again there is no necessary correlation



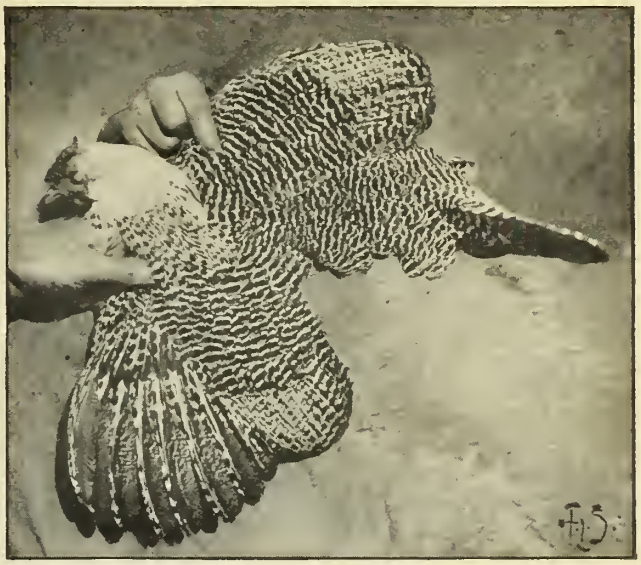
COMMON DEFECTS IN SILVER LACED FEATHERS

in the markings of parts. As far as it can be done without bringing too many different factors together, the compensation principle of balancing strength on one side of the mating with weakness in any point on the other side will apply to equalizing the character of penciling. The preferred standard ground color in the partridge varieties is described as a mahogany brown. The reference is to the lighter tints in old mahogany, as anyone may see who will compare the colors of a partridge hen with those of mahogany. A lighter ground than this gives color that lacks in richness of effect, while a ground as dark as some of the warmer light tints in mahogany makes the bird appear red rather than brown. The best results are obtained by keeping close to a medium shade, using the lighter and darker birds principally in compensation matings. It will happen sometimes, however, that a breeder gets remarkable penciling in a hen that is decidedly lighter or darker in general tone of color than he likes. In that case it is much better to keep closely within such lines of breeding that can be developed with this character from the hen and the mating that produced her. Selection within these lines can gradually improve the color in the desired direction without the risk of losing the quality of penciling while mating to improve the color all at once.

The red tinge on the plumage of gray females of this pattern is probably correctly explained as persistence in the plumage of the red pigment which gives the salmon color to the breast of the stippled gray pattern. In the more newly made varieties, the Silver Penciled Rocks and Wyandottes, this red might be attributed to the influence of the partridge varieties used in making them. It is possible also that crosses with the Partridge Cochin might account for it in Dark Brahmas; but there is no good evidence of recent crosses in the best strains, and in view of the lack of competition in Dark Brahmas and the small number of breeders of the variety, the persistence of red both in the females and in a brownish tinge in the silvery backs of the males is fully accounted for by lack of selection to remove it.

In the Silver and Golden Laced Wyandottes the male has the striped hackles and saddles of the ermine and penciled patterns, and the female has the same in the hackle; but the rest of the back feathers of the female, all the breast and body feathers, and a part of the wing feathers in both sexes have the colors of the pattern reversed, giving a white or bay-centered feather with black lacing. In the Silver and Golden Laced Polish and the Sebright Bantams the plumage throughout has the white ground with black lacing. In the Buff Laced Polish and Red Laced Cornish the pattern of the common striping in hackle is extended to the entire plumage. At first thought, a comparison of general color quality in the older varieties with hackle and body markings the same suggests that the distinct fine lacing obtained on the best Polish and Sebrights is made possible, or at least easier to obtain because the pattern is the same in all sections. That there is something in this must be admitted. The Wyandotte pattern is the more complex and that makes it harder for the breeder simultaneously to consider all factors entering into any given mating. But we must also consider that the Polish and Sebrights were fairly well-finished patterns before the Wyandottes came into existence, and that the modern open-centered pattern did not come into the stage of excellence in color that is now seen in them until about 1900.

The changes and improvements that have been made in Laced Wyandotte color within the easy recollection of breeders still under middle age may fairly be taken as an earnest of the possibility of the breeding of perfect specimens with the two opposed types of marking in the plumage of the same individual. While in a figure of speech we may not improperly refer to the arrangement of colors on the body as the reverse of that in the hackle, in a general analysis of color patterns such contrasting effects disappear, and we see that what at first appeared to be radically different color patterns are all modifications of similar tendencies. The breaking of the stripe in the hackle of a Laced Wyandotte is a manifestation of



BACK AND WINGS OF SILVER PENCILED HAMBURG FEMALE

a tendency to develop in the direction of the open center, or in the direction of penciling. The tendency to white or bay (as the case may be) frosting at the outer edge of the black-laced feathers is a manifestation of the tendency of these to take the pattern of the striped feather. Perfection at the same time in these different patterns is a matter of holding the different tendencies in equilibrium when both have been brought to the same degree of finish.

There is in the Laced Wyandottes the same tendency to light breasts and dark backs noted in the penciled varieties, and it appears to be more difficult to keep the large open centers free from mossiness than to keep the ground color of penciled varieties clean. The beginner in this pattern will get the best results if he concentrates his attention on the production of birds with clean ground color, sound black color, and moderately heavy lacing; leaving it to the master breeder to refine the lacing to the limit. The medium open center gives the novice more margin of safety than the large center. The average novice is apt to seize upon narrowness of lacing as the first point to work for in this pattern, and—finding it in the breast—to work for a perfect breast even at the sacrifice of quality elsewhere. It is also good policy for a beginner to devote his best efforts to the production of lacing, tolerating a little weakness in the striped sections rather than in the laced ones whenever called upon to choose between the two evils.

Systematic double mating is necessary to get males and females with the same type of lacing, but the lines are not as rigidly separated as in Barred Plymouth Rocks

and Brown Leghorns. Mating for uniformity in markings is mostly a selection of birds with the same type of markings, where that is meritorious, and avoidance of similar faults; keeping within known blood lines as much as possible, and going in the direction of open centers as long as clear lacing and a fair degree of uniformity in all sections is maintained; but checking development in that direction as soon as lacings begin to be indistinct in places. It should be noted that in this pattern the common tendency for the shaft of a feather to be lighter in color than the web, which in many places where it is manifested is considered a fault, becomes a merit.

The Penciled Hamburgs and the Campines present different degrees of completeness of barring in the plumage in both silver and golden ground colors. That these were originally developed from the same intermediate type of inferior barring is quite certain, though the character of the barring is now so different. The Hamburg is also particularly interesting from a color standpoint because in it the tendency of the male and female to differ in color was "encouraged" by selection until the male was made as nearly solid colored as could be in birds producing barred females. This case is particularly interesting for its bearing on the matter of double matings, showing that the practice will obtain and persist whether it is required that the birds match in the show pen or do not match. In fact, in this case where they were allowed to develop away from the close similarity of patterns in male and female which these varieties originally had, the separation of the two lines is wider than in any other.

The barring of the Penciled Hamburg is very fine and straight. The ground color is a clear white in the Silver variety and a reddish bay in the Golden, and in both the bars should be greenish black. A great many specimens fail in this particular, being well marked but with the black much modified. The well-barred standard female is produced in a line in which the males are quite strongly barred. The standard male, with hardly more than a suggestion of barring on the body, is produced from a line in which the females are very light in color, some of them being nearly white, and the barring is weak.

The Campines have a different character of barring from any other barred variety. In most barred patterns the design is to make the light and dark bars of nearly equal width. In the Campine the Standard calls for black bars four times the width of the light. The object of this exaggeration of width of the dark bar is to get rid of prevalent lighter secondary barring on both sides of the dark bar, which is a prevalent fault in the breed. Mr. F. L. Sewell, in "The Campines," treats this point as one appropriate at the present stage of the development of the breed, but takes the view that with the improvement of color and the elimination of secondary barring the tendency will be to make the white bars wider. This he says would also make it easier to secure the clean hackles desired. The system of double mating is the same as in Barred Plymouth Rocks, with the matter of the width of bars more important because the white bar has been so reduced in width. The standard male is mated with females that are very dark—with a narrow, faint white bar. This mating produces standard males. To produce standard females a standard female is mated with males having rather wide white bars.

Miscellaneous Color Matings

In all the color patterns previously considered certain common principles of mating are followed with a considerable degree of certainty as to results, and with practically full certainty in the case of every standard variety that it will produce only birds plainly recognizable as of the variety from which they come. The standard quality may differ greatly in individual birds but all will show the common variety characteristics. In the Blue Andalusian we have a color of which this cannot be said.

The blue color is not stable nor is the pattern of markings fixed. The color tends to break up into blacks, whites and occasionally some mottled and barred specimens. How far this tendency is permanent is an open question, for it appears to be the common practice of breeders of blue fowls to take both black and white specimens to mate with blues to get the desired shades of color and distinct lacings of dark blue on the lighter blue ground color. Analysis of the methods of mating as recommended by different breeders indicates that the safest way to breed blues is by compensation matings of blues in the same strain, dark males to light females and vice versa, making perhaps wider departures from the intermediate standard shade than is usually advisable in other colors.

In regard to the breeding of the pyle and duckwing patterns, the situation is somewhat similar, though there is more definite knowledge of the mode of production in which pronounced crosses figure frequently. The interest in these colors is too limited to give space to a discussion of them involving largely the results of repeated crossings rather than of direct line breeding.

Single Matings in Varieties Commonly Double Mated

In presenting the subject of single and double matings, I have so far treated it almost wholly in accordance with the general practice among good breeders. The reasons for this practice have been given in detail. It remains, before leaving the subject, to state the conditions under which a breeder who desires to do so can put many varieties now commonly double mated on a single-mating basis. The rule for this is very simple: BREED ONLY FROM MATINGS THAT PRODUCE EQUALLY GOOD STANDARD SPECIMENS OF BOTH SEXES. The common obstacle to following the rule is that such matings are comparatively rare, and that there is no way of identifying them before the progeny mature. Consequently it often happens that a mating which gave this much desired result is dispersed and the birds killed or sold before this value of the mating is discovered.

In general, good breeders of all varieties that are not regularly double mated try to get as many birds as possible from matings that produce both males and females of the highest standard quality, but, so far, only a few of the most skillful of the small breeders, or larger breeders with moderate-sized flocks of a variety, have been able to develop strains produced absolutely by single mating. We may anticipate that eventually progress in breeding will put so much stock of varieties now more or less regularly double mated on a single-mating footing that double mating in them will be abandoned. But this will be accomplished not by such slack application of low standards as will rate poor birds high, but by wider use of the methods of breeding that produce uniform high quality.

CHAPTER XII

Standard Breeds of Turkeys

The Wild Progenitor of Domestic Turkeys Indigenous to America—Introduction to Europe and Return of Domestic Races—The Standard Color Varieties of Turkeys, How They Were Evolved From the Original—Application of Principles of Breeding—Selection for Shape and Table Quality—Consideration of Laying Capacity—Details of Color Matings.

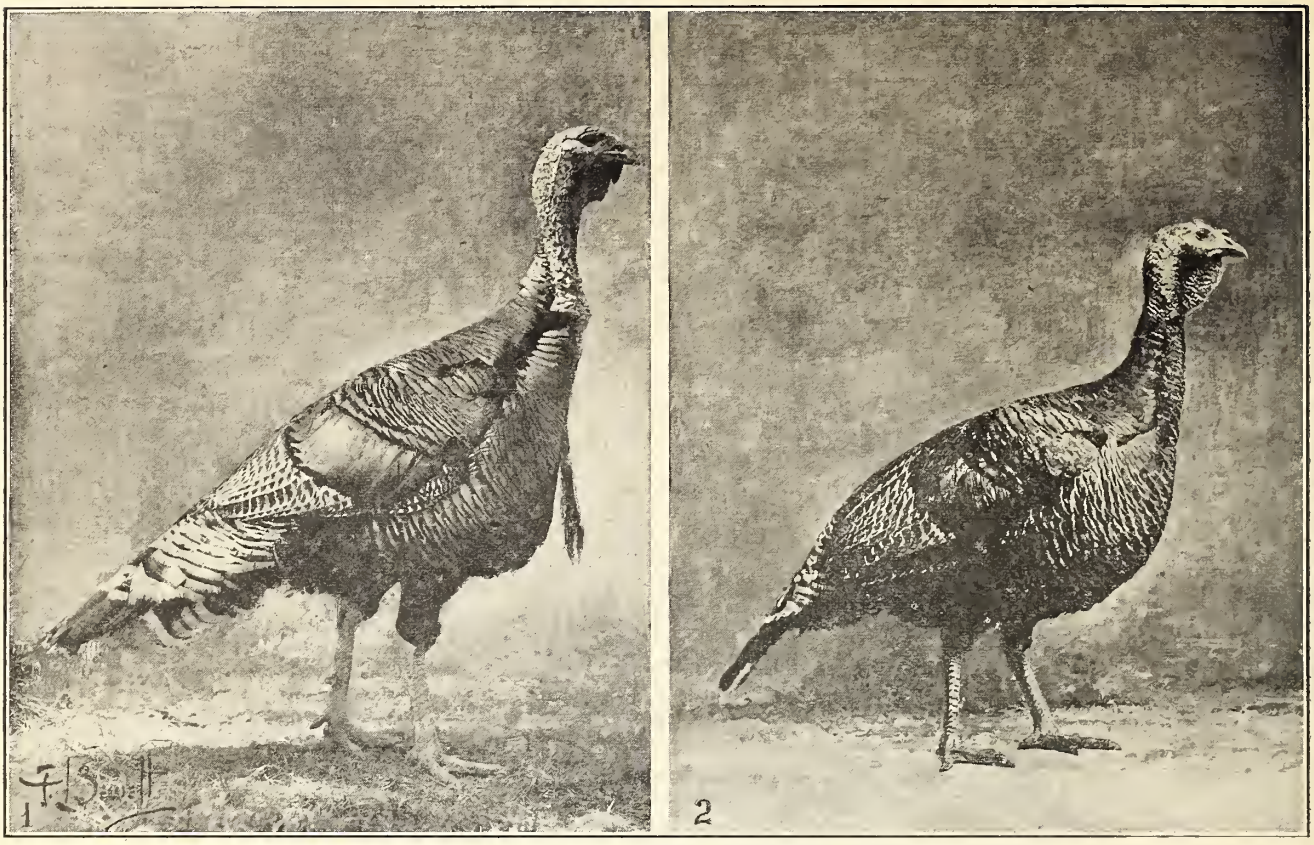
THE turkey is a native of America and is still found wild in some parts of the Appalachian Mountains and here and there in the Southwest. It was domesticated by the ancient civilzed peoples of Mexico and Peru, and it was from these domestic stocks, some of which were taken to Europe by the Spaniards soon after the discovery of America, that the Old World domestic turkeys came. Singular as it may seem, we do not know whether the early colonists in America brought domesticated stocks from Europe here, or produced the mongrel domestic turkeys that were common until comparatively recent years from captive wild stock. It has been generally supposed that the first domestic stocks here came from Europe, and that there was very little admixture of wild blood until the middle of the last century and after, when all kinds of poultry were being systematically improved. The principal ground for that supposition is the fact that almost without exception the early references to accidental or occasional mixtures of the stocks of wild and domestic turkeys indicate that it was the common experience that the half-wild turkeys were hard to keep in domestication, having a strong tendency to return to wild life. The general tenor of the early references to that seems to indicate that the domestic turkeys came from Europe. At the same time it would have been entirely possible for them to come from scattering flocks of North American wild turkeys domesticated in early colonial times.

BRONZE TURKEY MALE—SHOWING WELL MARKED WING

Standard Varieties of the Turkeys

The Standard classes turkeys as one breed with six color varieties, which also vary somewhat in weight, though the shape description for all is the same. Most of the early American writers on poultry did not even attempt to describe different varieties of the domestic turkey. Browne, in "The American Poultry Yard" (1850) says: "The domestic turkey can scarcely be said to be divided, like the common fowl, into distinct breeds, although there is considerable variation in color as well as in size, but no bantam or dwarf race exists, unless we except the small delicate-fleshed turkeys of Hempstead Plains, near New York, which often weigh when dressed not more than 4 or 5 pounds. The finest and strongest birds are those of a bronzed black, resembling as closely as possible the original stock. These are not only reared the most easily, but are generally the largest and fatten the most rapidly. Some turkeys are of a coppery tint, some of a delicate fawn color, while others are particolored, gray, and white and some few of a pure snow white. All of the latter are regarded as inferior to the black, their color indicating something like degeneracy of constitution, if not actual disease."

We see here in the popular notion that the darkest or bronze specimens in flocks of various colors were superior in size and stamina, the beginning of the development of the modern American Bronze Turkey. Bement, writing six years later, has nothing particular to say of distinct varieties, yet by the early 'seventies the Bronze Turkey was well established as a distinct variety, and good specimens of it were widely distributed, although the greater part of the turkeys were still of a mongrel description. Although erroneous, the idea that white poultry lacked vitality was long common. Indeed, it is only within the past quarter of a century that the prejudice against white color has disappeared. The color of a bird has nothing to do with its vitality, but whatever the color may be, the vitality of the bird affects the quality of that color. A vigorous Bronze Turkey with the quality in color that results from and expresses its abundant vitality is a more strikingly handsome bird than one of equal quality in any other color. Some of the others may be fully as beautiful, but they are not so conspicuously handsome in all settings and under all circumstances. Hence, it was quite natural that when people began to take an interest in the improvement of poultry the bronze specimens should be selected as the most desirable, as was done not only in America, but in Eng-



BRONZE TURKEY COCK AND HEN

land where the bronze stock of the variously colored Cambridge Turkeys was given the preference to an extent that eventually made the Cambridge Turkey a bronze variety.

The English Cambridge Bronze, however, though somewhat mixed with the American Bronze, is a less brilliantly colored bird. The variety is not known in America, but from the comparative descriptions of English writers it would appear to resemble much the variety known here as the Narragansett. This developed as a local variety in the vicinity of Narragansett Bay, R. I., and may possibly have been a good distinct variety before the bronze variety was fixed. Upon that point information is uncertain. It is also doubtful that any considerable proportion of the gray turkeys that have been exhibited in other parts of the country than the section from which the Narragansetts took their name was of the same stock and type. Almost any mixed flock of turkeys produces some dark gray specimens to which the standard color description would apply. In its native locality the Narragansett Turkey is nearly if not entirely extinct. About fifteen years ago the writer in a two days' search of this section was able to find only one small flock of four birds of this variety, and since that time he has not seen any there, nor have the birds exhibited sometimes as Narragansetts that he has seen been specimens that anyone acquainted with the type would accept as typical.

The true Narragansett Turkey was in fact a distinct breed, and when we analyze type in the several varieties of the turkey as we have them we find that they actually do show the same range of differences in form as we have in the breeds of the American and Mediterranean classes of fowls. The difference is that in turkeys only the Bronze has so far been given a standard feature that tends to differentiate it from the common type, although the Narragansett as developed in the Narragansett district was given a quite distinctive type by some of the breeders most interested in it. There is really the same reason for differentiating the turkey class into breeds of different sizes and weights as for differentiating a class of fowls in that way. In two other color varieties, the white and the red, strains have been developed with the size and weight of the bronze variety. In the logical course of the development of standards for turkeys it is to be anticipated that eventually there will be a division into breeds, probably with the same color varieties in all.

Color of Wild and Bronze Turkeys

The color of the wild turkey is commonly described as like that of the domestic bronze variety, but both the wild and half-wild turkeys that the writer has seen in captivity have quite invariably been much darker in color than the exhibition standard Bronze Turkeys, with lustres more on the dark greenish and purplish than on the coppery bronze tone. Some, however, are much lighter and more brilliant in color. Selection in the domestic Bronze has worked constantly to standardize the tone of greatest brilliance in the males. The color pattern in the Bronze Turkey is a combination of barring and mottling or spangling as seen in fowls, but the tip of a feather on the body or in the tail of a turkey being wide and square, the marking which on the narrow-pointed or round-tipped feather would be a spangle or mottle, becomes a wide band or a straight bar.

Thus, with a copperish ground color, each feather of the breast of the male has a black band straight across the tip, while in the female there is outside the black band

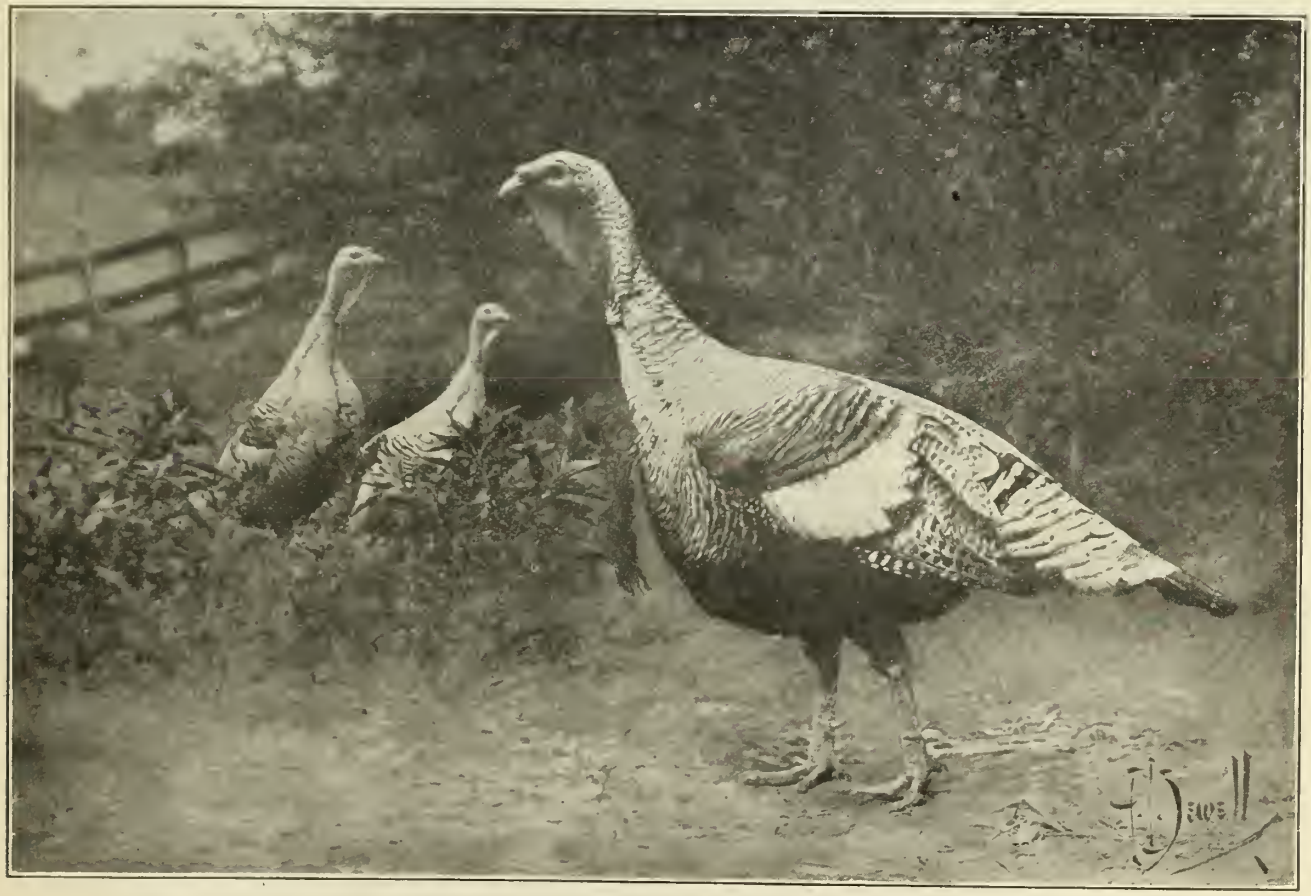
a narrow edge of white, making a pattern which in a general way corresponds to the double spangling of the Speckled Sussex. The body and fluff of the male are black with a bronze band or bar across the tip of each feather. The female has the same markings with the addition of the white tip. In both sexes the flights are finely barred black and white, and the main tail feathers are black with brown bars, a wide black band, and a wide white band at the tip. The coverts are similarly marked, and in the spread tail of a male strutting these black and white bands form arcs of circles. All these details of color and markings are greatly improved by careful selection in breeding.

Evolution of Other Colors

The development of the different colors and color varieties of turkeys from this highly pigmented pattern may be traced in the same way as the evolution of the various color patterns of fowls from the original black-red color pattern. The bronze effects obviously come from a peculiar distribution of red in the plumage, though because of its lustrousness we are more impressed by the apparent metallic effects than by any perception of substantial pigment. Red as a color in the plumage of a Bronze Turkey is so little noticed that people frequently, in considering turkey colors, wonder how the buff and red could be produced. Absence of the red and the bronze effects gives gray turkeys. Absence of the black gives a dirty buff with white wings and tail. Intensification of this buff brings red—still with white wings and tail. Increase of black pigment eventually makes a solid black. Diminution of both red and black leads to a pure white. Slate color in various shades comes from blendings of white and black, and fawn color from a light mixture of red with a light slate. The colors are the same as in the pigmentation of fowls. Some of the combinations are similar, others quite different.

All General Principles of Breeding Apply

In the breeding of turkeys principles apply precisely as in the breeding of fowls. There is a general impression, often confirmed in the minds of those who entertain it by the opinions of well-known and successful breeders of turkeys, that inbreeding must be carefully avoided if size and stamina are to be maintained. And it does frequently appear that turkeys deteriorate more rapidly than fowls when bred within the same lines continuously, but when all the circumstances are taken into consideration it is seen that the difference is accounted for by the fact that as commonly kept and managed turkeys are subjected to a great many more conditions unfavorable to full development and great constitutional vitality. Indeed, the obstacles to allowing turkeys the freedom they require to keep them thrifty while growing, and at the same time keeping them from interfering with other poultry or trespassing where they should not go, and in all seeing that they are so well fed that they will make the best possible growth, are such that only a small proportion of farmers attempt to keep turkeys, and the proportion of those who manage them to good advantage is still smaller. There is accordingly more occasion for the greater number of turkey growers and breeders frequently to introduce more vigorous stock, but the important thing is not new blood but vigorous blood. Unless the breeder gets more vigor he is no better off than when continuing breeding within his old stock.



NARRAGANSETT TURKEYS, COCK AND HEN

Vigor the First Point in Selection

While going outside for vigorous blood as seems to be necessary, the turkey breeder ought not to neglect careful selection of the most vigorous specimens in his own stock for breeders. It by no means always happens that the new bird or birds bought for their vigor infuse that quality into the flock, nor is their failure to do so evidence of want of vigor in the flocks from which they came. The point of adaptability comes in here. In all kinds of poultry there are individuals that are thoroughly vigorous under all ordinary conditions of life and in any climate. There are others that are perfectly vigorous only under favorable conditions and in a climate similar to that of their native locality. A much more limited number of individuals seem perfectly thrifty under conditions which for most of their kind are unfavorable. A quiet, contented disposition, with great native strength of constitution and absence of susceptibility to contaminated soil, and strong resistance to disease appear to be the qualities which make some individuals and flocks of turkeys thrifty under much more intensive conditions of life than those under which turkeys are ordinarily successfully kept and reared. When a turkey grower succeeds by intensive methods the results show careful attention and good management, but with this there must be adaptation of the stock to the conditions or the results will not be at all remarkable.

BOURBON RED TURKEY COCK

Selection for Shape and Table Quality

After vigor the first considerations in selection of turkeys for breeding purposes are table form and quality. No domestic turkey lacking these has any excuse for being. The breeding of standard exhibition turkeys rests commercially on the ability of the breeder to supply farmers with stock which will improve the market and table qualities of their flocks. In all varieties of turkeys the Standard calls for size and weight far above the common average, and these are obtained by selection for fuller development and capacity for quick growth. Excessively large turkeys are not generally desirable as breeders. They are apt to be coarse in both bone and fiber of flesh, and to require a long season for growth, which from a practical point of view is a disadvantage, for it is not desirable to have young turkeys out too early in the spring and the best market for turkeys is at the holiday season. The average farm breeding flock of turkeys in the United States is only from three to five birds. There are not more than half-a-dozen states where it is more than five, and none where it is as high as ten. This shows that on most farms growing turkeys there is not more than a pair or trio of breeders. Where such small numbers are kept it is both more important, and comparatively easier, to have the breeders of good quality and uniform type.

Consideration of Laying Capacity

As turkeys are not used for market egg production, the value, from a breeding standpoint, of laying capacity in turkeys depends largely upon locality and climate. Where the weather permits of starting young turkeys quite early in the spring and there is range enough for a succession of broods the extra good layer among hen turkeys is appreciated. Where the season is short and it is desired to get all turkeys reared hatched as nearly as possible at the same time, her superiority as an egg producer is of less advantage. The grower keeps as many hens as are necessary to hatch the turkeys he wants at the time he wants them, and a hen that lays afterwards is of no more value to him as a breeder than the others.

Color Matings of Turkeys

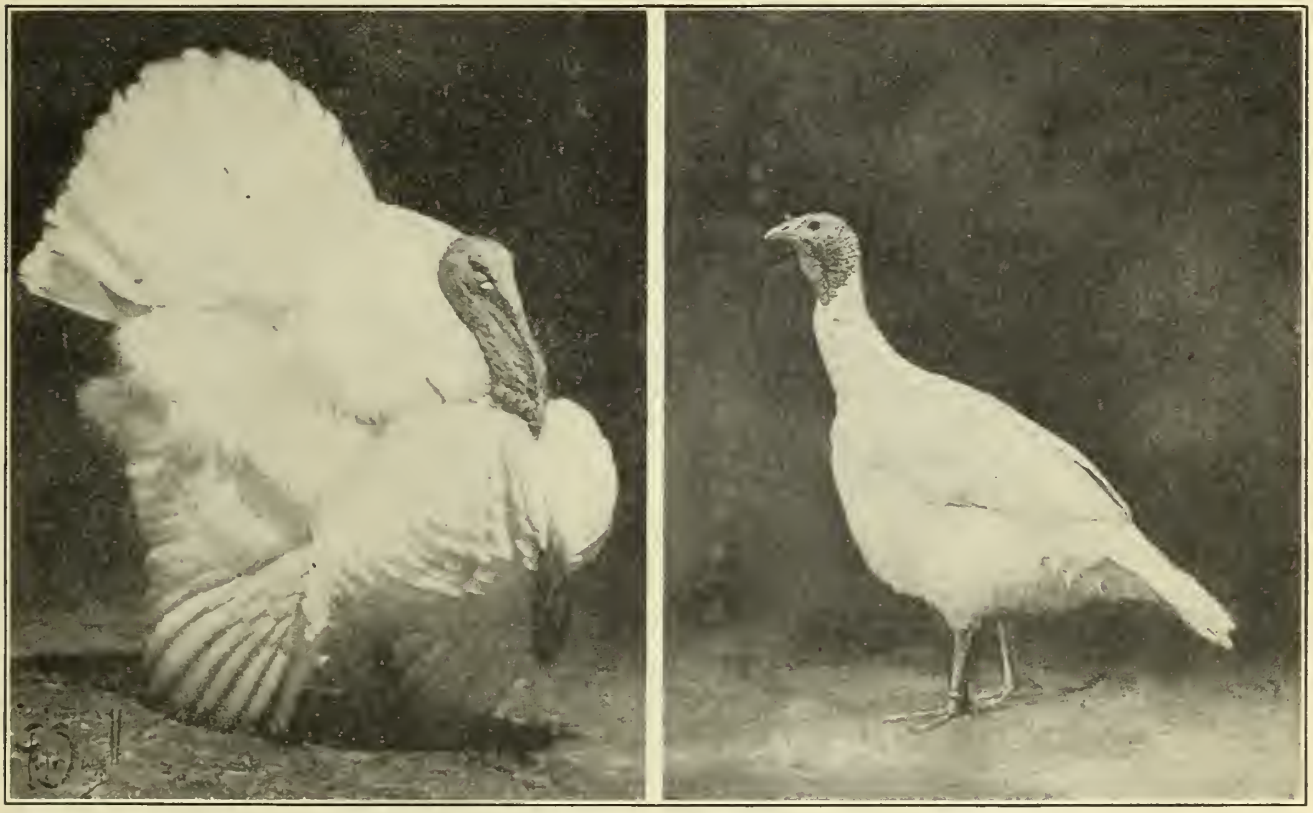
In mating for color in Bronze Turkeys, particular attention should be given to the quality of the bronze effects in the plumage, and to the character of the barring where barring is called for. As intimated earlier in this chapter the attractiveness of good bronze color leads incidentally to selection for the vigor of which it is an expression, and so in common practice tends to a better selection of Bronze Turkeys than of others. With good bronze color however, there should be careful selection for the improvement of barring in the wings and tails, for the display of these in the strutting male makes nice marking in these sections a greater contribution to the beauty of the birds as seen in the yards than correct markings on the wings of poultry that do not make such frequent and conspicuous display of them.

In mating for color in gray turkeys the same general rules are followed as in mating silver penciled or laced fowls. The black, where black is called for, must be a good sound black; the white markings must be clear; and where a shade of gray is specified the dividing lines between it and black or white must be clearly defined.

In mating Bourbon Red Turkeys the general rules for mating buff and red colors are followed, but the application of the rules is modified in an opposite direction because in fowls either the wing and tail are of the prevailing color of the plumage or are more or less mixed with black, while in the turkey the wing and tail are white, and the tips of the feathers on the breast, body and thighs of the female are also white. Consistency in interpretation of the phenomena of color breeding in poultry requires the admission of the possibility of producing a sound buff or red wing in turkeys; but though from 1875 to 1915 the Standard of Perfection described a buff variety of the turkey either as having wings and tail of pure buff of the shade of the body plumage, or described the flights as a little lighter in shade, birds of this description were never seen. Both wings and tail were almost always more white than buff, nor was good buff color in any section at all common. This lack of quality in buff color in turkeys was no doubt due in part to a lack of interest in breeding turkeys of other colors than bronze and white for exhibition, and to meet the commercial demand for males to improve farm flocks, but the problem itself is one of unusual difficulty.

When Bourbon Red Turkeys began to come into popularity the breeders wisely decided to make the wings and tail white. In line with the general development of Standard ideals it is to be anticipated that eventually both good buff and good all red turkeys will be produced, but at the present time the development of a pleasing color combination with good quality demands the white wing and tail. Few specimens are seen as yet that are near perfection in either red or white sections, but the red turkeys generally show remarkable improvement over the type of ten or fifteen years ago. It is interesting to note here the reasons for the success of the movement to popularize a red turkey after the long effort to make a buff variety met with so little success. The contemporaneous boom in Rhode Island Reds undoubtedly helped the red turkeys. Yet it could not have helped them much had there been no other condition working to their advantage. What did most to maintain them in favor wherever they were introduced was the fact that good red, like good bronze, was almost invariably associated with thrift and vitality.

A breeder of superior white turkeys will probably hold that there is a quality in the perfection of white color as displayed on a fine white turkey that should have the same effect on selection that the striking tones of bronze and red have. For those who appreciate the perfection of white plumage this may be admitted, but it has never been shown in ordinary selection as it has been in the other cases mentioned. Ordinary unskilled breeders do not improve white, gray, slate or black turkeys as they do the bronzes and reds by simple selection of the specimens most attractive to them. Selection for vigor in white and other color varieties grouped with it will generally fail if it is not direct selection for that quality based upon the manifestations of vigor in the form and carriage of the bird. As has been pointed out elsewhere, the tendency of the inexpert in judging and selecting breeders, is to select for one conspicuous point, and this is almost invariably either a striking point in color —and one in which marked differences are common in most flocks of ordinary breeding—or a superficial point in which variations may be considerable. Further, in the breeding of white turkeys in particular, type and carriage are more important than in any other variety because in near-perfect white turkeys the impressions of shape and color upon the untrained eye are balanced and equalized as in no other variety, and are made simultaneously.



WHITE HOLLAND TURKEYS, COCK AND HEN

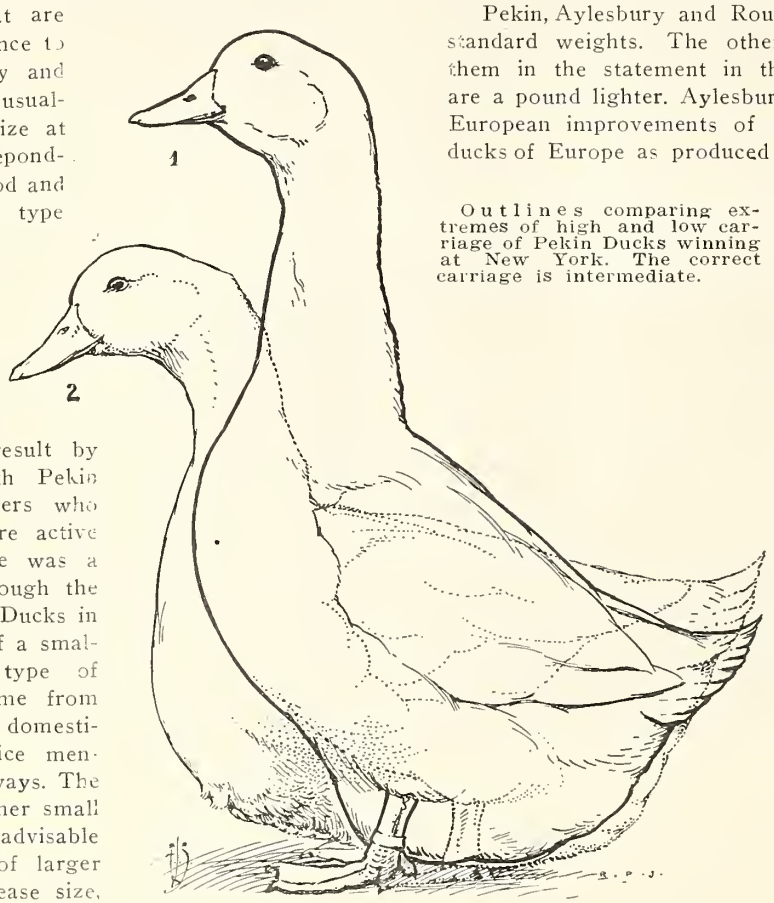
CHAPTER XIII

Standard Breeds of Ducks and How to Produce Them

Varied Origin of Breeds of Domestic Ducks—Their Introduction to and Development in America—Breed Types and Characteristics Analyzed and Compared—Why the Finest Table Ducks Are Not Most Profitable for Market—Laying Types of Ducks—Colors and Color Patterns of Standard Varieties Described in Detail—Methods of Mating to Produce Them.

Origin of the Breeds of Ducks

ALL of the breeds of the domestic duck except the Muscovy appear to be undoubtedly descendants of the wild Mallard Duck, which is still frequently kept in captivity and is both quickly increased in size by being kept quiet and well fed in confinement, and used to cross with Rouen Ducks to give a more active and energetic bird. The pure wild Mallard stock is said to become as large as ordinary Rouens in a few years. Where the cross of Mallard on Rouen is made it checks the tendency to excessive fat and to sluggishness which develops in stocks that are bred with special reference to table form and to early and easy fattening. There is usually some reduction in size at first, but by using a preponderance of the Rouen blood and by careful selection for type and size all traces of the Mallard infusion except greater activity are soon bred out again.



Outlines comparing extremes of high and low carriage of Pekin Ducks winning at New York. The correct carriage is intermediate.

Breeders of heavyweight Pekin Ducks accomplish the same result by occasional mixtures with Pekin stock from other growers who use a smaller and more active duck. About 1907 there was a general distribution through the flocks of market Pekin Ducks in America of the blood of a smaller and more active type of Pekin said to have come from Japan. As it concerns domesticated ducks, the practice mentioned is worked both ways. The breeders who use a rather small market Pekin find it advisable to go to the breeders of larger stock for birds to increase size, and by a coincidence, at the very time that the smaller Japanese Pekins were being used for an outcross by American breeders Japanese poultrymen were buying large Pekins in America to increase the size of the Japanese stock.

Breed Type and Characteristics

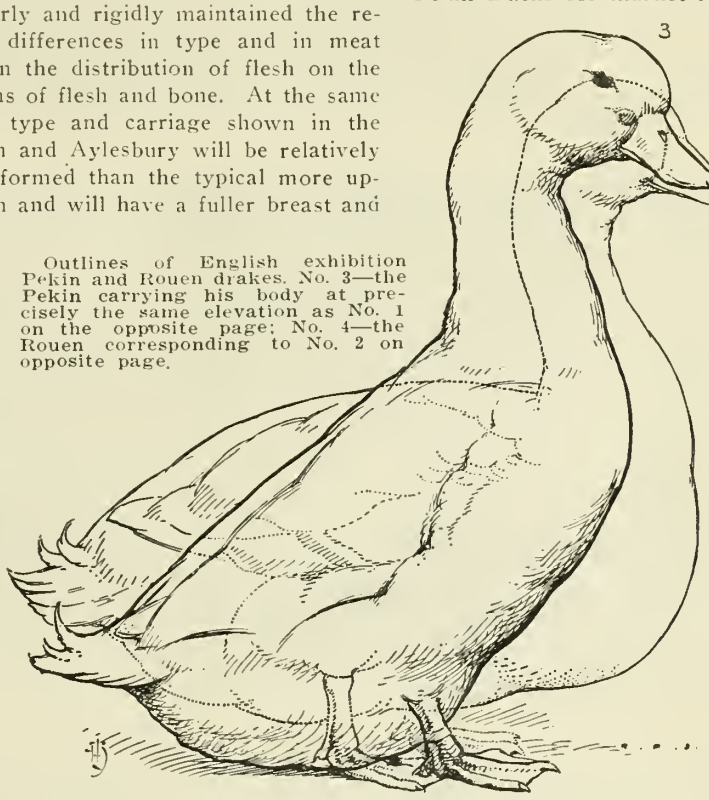
Breed types in ducks are more differentiated than in turkeys, but not so well defined as in fowls—that is, the differences in standard types are not as clear-cut (as between types of the same general character), nor are these differences related to the adaptability of the breeds. It was shown in the discussion of type in fowls that the differences in type in the Plymouth Rock and Wyandotte were deliberately made to adapt them to somewhat different purposes, and that the necessity (from the Standard makers' viewpoint) for giving the Rhode Island Red a still different description led to fixing a type for it that gave it special adaptations. The situation with reference to the standard descriptions of Pekin, Aylesbury, Rouen, Cayuga, Swedish and Buff Ducks is like that which affected the making of standard breed specifications for the Rhode Island Red, but no conditions existed, or at present seem likely to develop, which make the standard requirements peculiarly beneficial to a breed, as they were in the case of the Rhode Island Red.

Pekin, Aylesbury and Rouen Ducks have the same standard weights. The other breeds grouped with them in the statement in the preceding paragraph are a pound lighter. Aylesbury and Rouen Ducks are European improvements of the common domestic ducks of Europe as produced unknown centuries ago from Mallard stock, and doubtless from time to time temporarily modified by new infusions of wild blood. The Aylesbury was developed as a local improved breed in England, but would appear from historical references to have become somewhat degenerate in stamina by the time interest in the improvement of poultry made an opportunity to popularize it. The Rouen, as a large quick-growing domestic duck of the color of the original wild species, was developed in France, apparently further improved in type in England, and from there brought to this country. In the American Standard the Aylesbury and Rouen have the same shape description. On the general principle of distinction between breeds and varieties they should be considered varieties of the same breed.

The Pekin Duck is a Chinese improvement of domestic stock derived originally from the wild Mallard. The only Chinese ducks brought to this country were the few white ones that were the ancestors of all our Pekin stocks, at least up to the time of the Japanese Pekin cross that has been mentioned. The close similarity between Pekin and Aylesbury is shown by the fact as vouched for by English authorities that promptly after its introduction in England the Pekin was used for the

remaking of the Aylesbury with a more vigorous constitution. While only white ducks were brought here from China, photographs of flocks of ducks in China have been brought which show in flocks that are predominantly white both the color of the Mallard and Rouen, and such mixtures of white and other colors as are usually found where white and colored ducks breed promiscuously.

The standard difference in shape between the Pekin and the Aylesbury and Rouen is principally a difference in carriage. The European breeds are described as carrying the body horizontally, or nearly so; the Pekins as carrying it slightly elevated in front. With this difference in carriage of body the specifications call for a back that shows a nearly straight line in Pekins while in the others the line of the back is quite convex. If these differences were regularly and rigidly maintained the result would be certain differences in type and in meat qualities—particularly in the distribution of flesh on the bird, and in the relations of flesh and bone. At the same weights a bird of the type and carriage shown in the Standard for the Rouen and Aylesbury will be relatively finer boned and fuller formed than the typical more upstanding standard Pekin and will have a fuller breast and more meat on the back. That is, the standard Pekin is not quite as good a table type as the Aylesbury and Rouen. Its greater popularity as a market duck is in part due to that fact, and in part to its more robust constitution and greater prolificacy. Its more upright carriage comes from greater strength and a balance of the body that throws the front a little higher than the rear.



Outlines of English exhibition Pekin and Rouen drakes. No. 3—the Pekin carrying his body at precisely the same elevation as No. 1 on the opposite page; No. 4—the Rouen corresponding to No. 2 on opposite page.

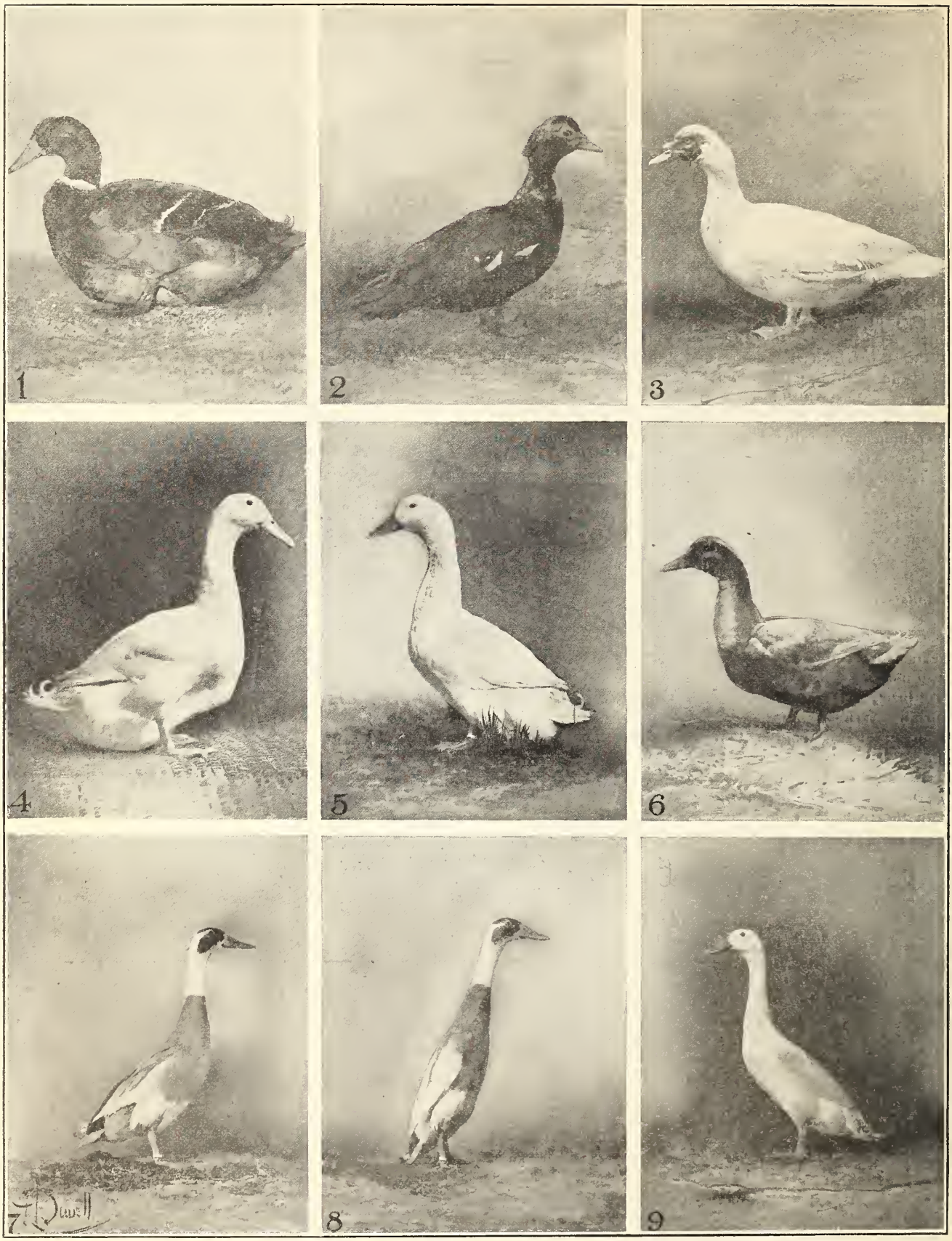
When a breeder of Pekin Ducks for market, starting with birds of the typical standard form and carriage, selects continuously for the best development of meat properties he inevitably puts more meat all over the bird, and the result is that the breast which is usually most developed takes on enough more weight to bring the body nearer to a horizontal posture and the back is more rounded. This breeding for flesh and quick fattening tends to make the ducks less vigorous and active, to reduce their egg production, and to diminish fertility, and furnishes the occasion for crossing with lighter and more active birds which has been mentioned. Typical Pekin carriage can be maintained with increase in quantity of meat by increasing the size and weight, and that is done to some extent, but it usually leads to the use of rather coarse birds, which is undesirable. While the standard Pekin type may be said to describe a type of Pekin which could be maintained indefinitely, in practice the growers of heavy market ducks work between the Pekin and the Aylesbury-Rouen type, the tendency being to keep as close to the latter as possible without serious reduction of prolificacy and fertility.

The breeders of Pekins who use a smaller type of duck usually vary from the Pekin type in the other direction, making a duck that in type is substantially the same as the Swedish, Cayugas, Buff Ducks, and the ordinary run of American Rouen Ducks that lack distinctive standard type. The Indian Runner is a still smaller, very active duck, of inferior meat qualities but with the habit of continuous laying as well developed as in fowls. It has naturally with these qualities a more erect carriage, but the birds do not as a rule exhibit in ordinary poses the nearly perpendicular carriage shown sometimes in illustrations. That the activity of the Runner depends much upon its being reared on range and required to forage, and that the type is remarkably modified by conditions of life has been shown in cases where breeders of Pekin Ducks for market reared Runners under the same conditions and with heavy feeding. By these means alone stock that on range with relatively light feeding would have been typically Runner in size and carriage has been increased forty to fifty per cent in size and weight and the distinctive carriage prevented from developing. Also in cases where Pekins of heavy market stock have been made to forage for their feed, growth and the rate of growth have been greatly reduced and the carriage modified, though not to the same extent as in the other case. The very small ducks, known as Call Ducks, and the crested ducks are of the form of the original type.

The Muscovy Duck is regarded as of a different species from other domestic ducks, and not akin to the Mallard except as both wild Mallard and Muscovy may have come from a common remote ancestral form. The Muscovy is found wild only in South America. The conspicuous peculiarities of the breed are the bare face with red carunculated skin, a shape suggesting the outlines of a goose quite as much as of a duck, and the males are relatively much larger than the females, and have a slight tuft on the head. Muscovy Ducks are vigorous and hardy and because of this and their white color were used for market in America in preference to the Aylesbury and Rouen before the introduction of the Pekin.

Colors and Color Patterns of Ducks

It has been stated that the color of the Mallard Duck from which most of our domestic ducks have been derived is retained by the Rouen and ducks like it in color. As a general statement this is correct, but in a close comparison some differences are found. In the first place, it should be said that there is considerable variability in the coloring of Mallards of the same sex, as well as a distinct difference in the type of marking and coloring in the sexes. The conspicuous points in the coloring of

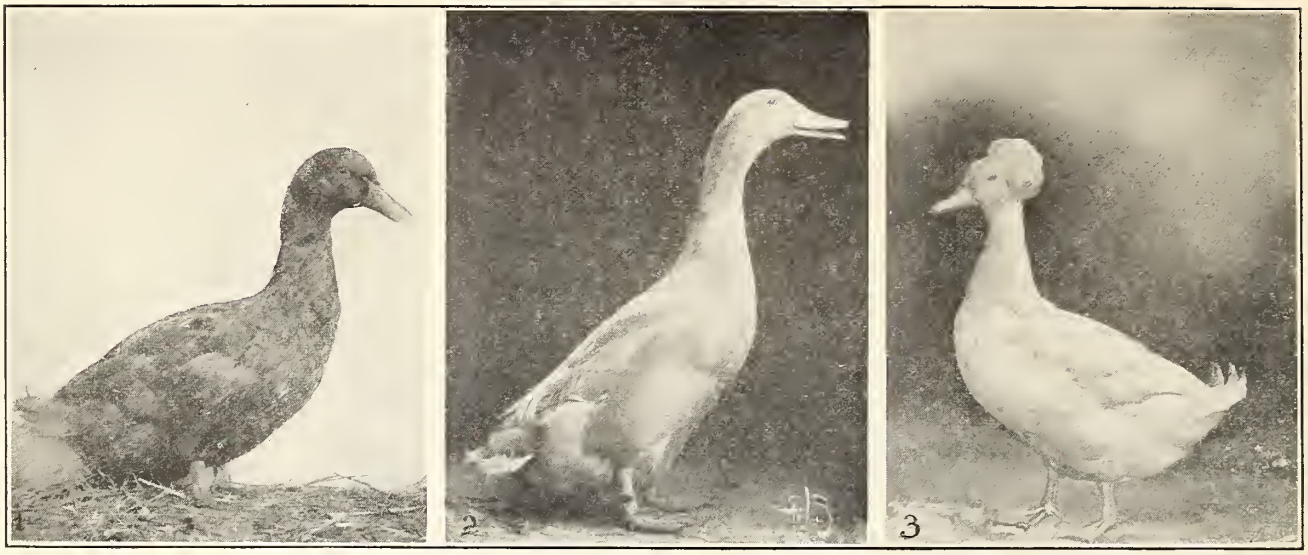


MALES OF SIX BREEDS OF DUCKS

1—Rouen; 2—Colored Muscovy; 3—White Muscovy; 4—Aylesbury; 5—Pekin; 6—Blue Swedish; 7—Penciled Runner; 8—Fawn and White Runner; 9—White Runner.

FEMALES OF SIX BREEDS OF DUCKS

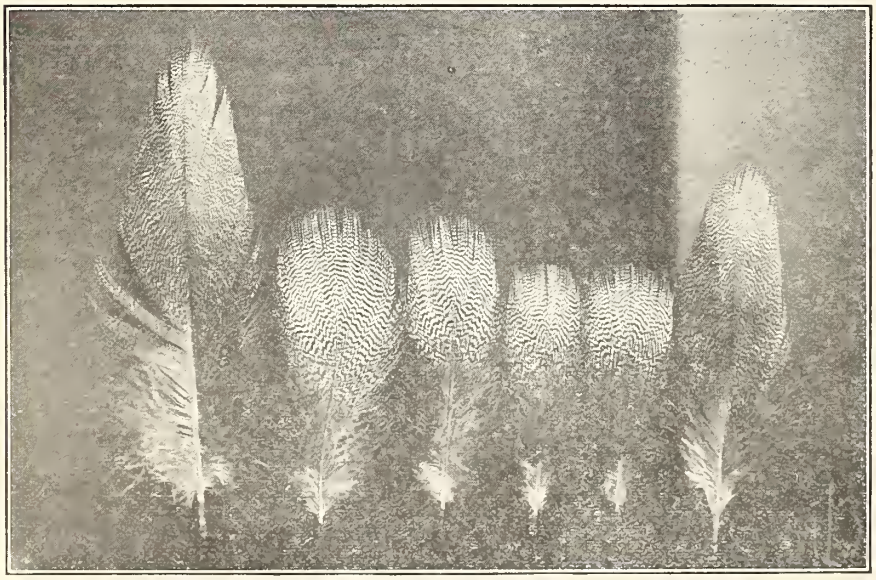
1—Rouen; 2—Colored Muscovy with brood; 3—White Muscovy with brood; 4—Aylesbury; 5—Pekin; 6—Blue Swedish; 7—Penciled Runner; 8—Fawn and White Runner; 9—White Runner.



1—BLACK CAYUGA DRAKE; 2—BUFF DRAKE; 3—CRESTED WHITE DRAKE

Mallards are the lustrous green head and neck of the male, and the iridescent blue-ribbon-like bars bordered on either side with narrower white bars seen on the folded wings of both male and female. Aside from this common feature the coloring of male and female is quite different. The body of the male is predominantly gray mixed with fine brown lines, with the brown much increased at the middle of the back and shading to black toward the tail, and the underpart of the body to the rear becoming nearly white. A white ring extends nearly around the neck, and the breast below this is a rich reddish buff or chestnut.

The female is predominantly brown, the ground generally an ashy buff, with darker brown markings having a pronounced tendency to take the form of penciling as seen in the partridge-colored fowls. In flocks of Mallards as seen in zoological parks quite a wide range of color may be observed in both males and females.



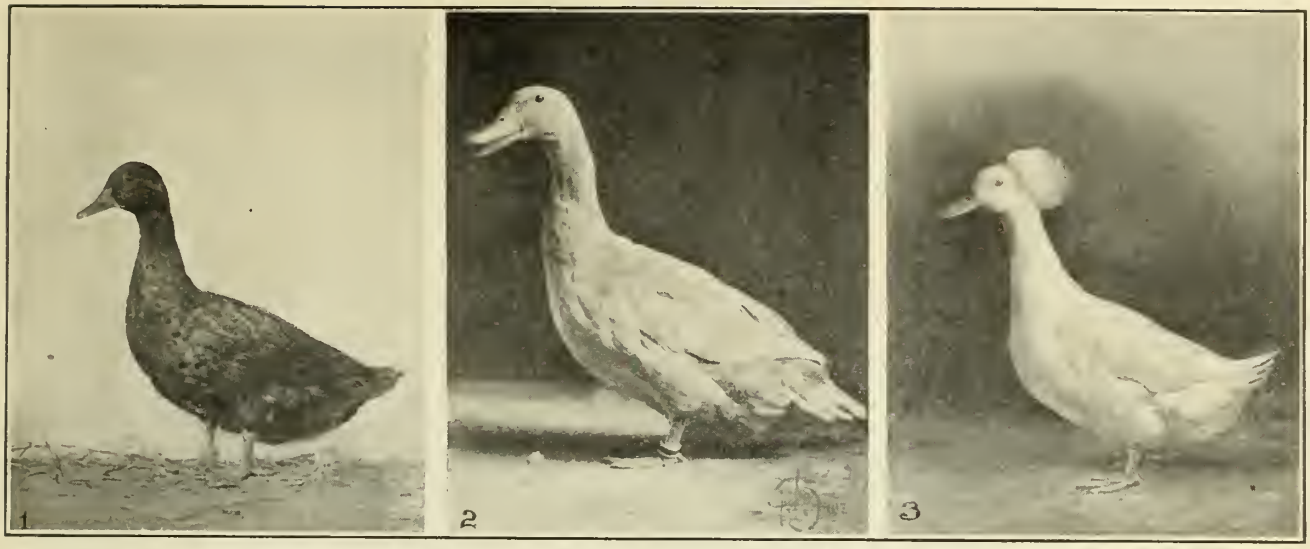
FINE PENCILING ON ROUEN DRAKE PLUMAGE

The standard Rouen Ducks are of the richest colorings that can be developed from a natural type of this description. The ring on the neck of the male is made more regularly distinct than in the wild race; the brown is eliminated from the back, and intensified on the breast, which is described as a purplish brown or claret. The black in the back is increased and its green sheen intensified. In the plumage of the female the ground color is clarified and the markings made distinct and regular. The white is eliminated and the brown shades enriched.

These developments have the same effect as to breeding that perfecting the patterns in parti-colored fowls has. They have led to systematic double mating, and separate lines of breeding for the exhibition male and female; but because of the limited interest in the breed and the fact that with a few notable exceptions breeders of Rouens have not taken enough interest in them to breed persistently for the best result obtainable, the lines are generally somewhat mixed, and many matings are of the intermediate sort using one male with different types of females.

There is so much white visible on the Mallard, and on the lighter-colored domestic ducks having this pattern, that the production of white ducks by progressive selection would be a much shorter process than the production of a white fowl or turkey from stock of the original color. Yet it is altogether probable that white domestic ducks appeared as sports. In the old flocks of common ducks there were usually birds with the Mallard coloring, white birds, and intermediates in which the color was sometimes like that of the Mallard with the strength of pigment quite uniformly reduced in all sections, and sometimes broken in spots and patches distributing at random as the markings of cattle commonly do. In the Blue Swedish and Fawn and White Runner Ducks regularity in these markings is developed, and also changes in the character of pigmentation. Black ducks are readily accounted for by progressive selection. Some very dark specimens appear in the male lines of exhibition Rouens.

Once both black and white are obtained and the birds



1—BLACK CAYUGA DUCK; 2—BUFF DUCK; 3—CRESTED WHITE DUCK

allowed to breed promiscuously with those of the original color, as was the case in flocks of ducks generally, an endless variety of shades and patterns became possible. Only a few of these have been developed as established variety colors. The Blue Swedish Duck is a rather uneven blue, usually much darker in the male than in the female, and darkest on the head, which retains the brilliant sheen of the Mallard. The ring on the neck of the male is enlarged to a patch of white, sometimes extending well down on the breast in both male and female.

The colored Indian Runners were at first irregularly marked, but by degrees a color pattern has been established that fixes the fawn color on patches on the top and sides of the head, and like a "slip-on" jersey from the ring on the neck about halfway to the tail. In the plain Fawn and White there is no sheen on the head, or markings on the fawn ground color. In the Penciled Runner

TYPICAL PENCILING ON ROUEN DUCK PLUMAGE

the male has a dull green head and the fawn ground color is lightly stippled on the back of the bird with a darker shade. In the female the fawn color sections are lightly penciled with lines following the contour of the feather.

Buff color in ducks comes when the red is uniformly distributed through white instead of taking the form of patches with higher coloring (fawn). Good buffs are decidedly rare.

The wild Muscovy Duck is black or nearly so. Colored Muscovys in domestication are usually more or less mottled with white, or marked with irregular white patches. The cross of Colored and White Muscovys sometimes gives offspring of a uniform shade of blue, but oftener—apparently—mottled, or patchy black and white.

Mating Ducks for Type

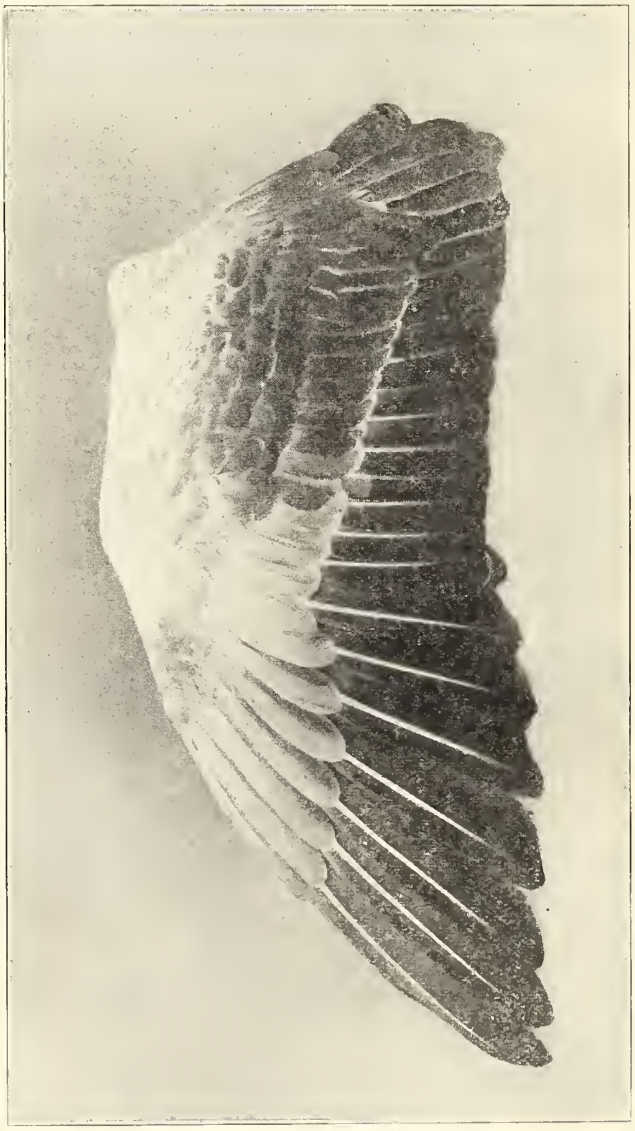
The discussion of breed shape and type in ducks anticipated the points which should be primarily considered in mating practice. Unlike the breeding of fowls for the table, the breeding of market ducks in America has had the most thorough consideration by a large proportion of those engaged in it, and the stocks of the large commercial duck growers are as well bred to the standards of their requirements as the best exhibition fowls in the country. The primary reason for this is that when market duck growing was first developed on a large scale with the Pekin Duck, nearly all the leading breeders for market sold eggs for hatching and stock for breeding, and consequently there was keen competition among them in the shows. As the demand for green ducks increased the commercial duck growers operating on a large scale generally found the correspondence relating to the sales of products elsewhere than in the markets a heavy burden at the time they were least able to carry it; and, as the trade was principally on a basis of "utility" prices, the profit in it was not great enough to warrant giving attention to it to the detriment of market production. So large duck growers generally discontinued exhibiting and the sale of stock and eggs for hatching, but continued the careful attention to type and breeding which experience as competing exhibitors had taught them, and the men trained in the business under them were taught the same practice.

CHAPTER XIV

Standard Breeds of Geese and How to Produce Them

Probable Origin of European and Asiatic Stocks—Canadian Wild Goose Regarded As An Entirely Distinct Species—Description of the Standard Breeds and Varieties of Geese and Discussion of Matters Relating to Their Possible Common Origin in Very Remote Times—Methods of Mating for Table Purposes and for Exhibition.

OUR domestic geese appear to be from three different wild sources. In Europe, Western Asia and Northern Africa geese of the type now most familiar appear to have been generally distributed long before the beginnings of written history. The reputed wild ancestor of these is the Gray Goose, or Gray Lag Goose. The geese that have come to us from Eastern Asia, the Brown and White Chinese Geese, are of very different type, and perhaps from different wild ancestry. Although we owe so much in the improvement of our poultry to Chinese stocks we have little definite knowledge of Chinese poultry except as it has come to us by chance. We do not know whether the geese we call Chinese are the common and exclusive type in that land, or whether they are one of several types produced there, whether they are perhaps from the same wild race as our common geese, or presumably from some wild stock peculiar to that part of the world. In view of the marked difference in type, and of the limited extent of modification of types of geese in Western Asia and Europe, it seems most probable that Chinese Geese are of a different origin; yet it is not at all impossible to derive them from the same species. The development of the peculiar knobbed bill did not involve as much structural modification as was made in the heads and beaks of the crested varieties of fowls to support their large crests.

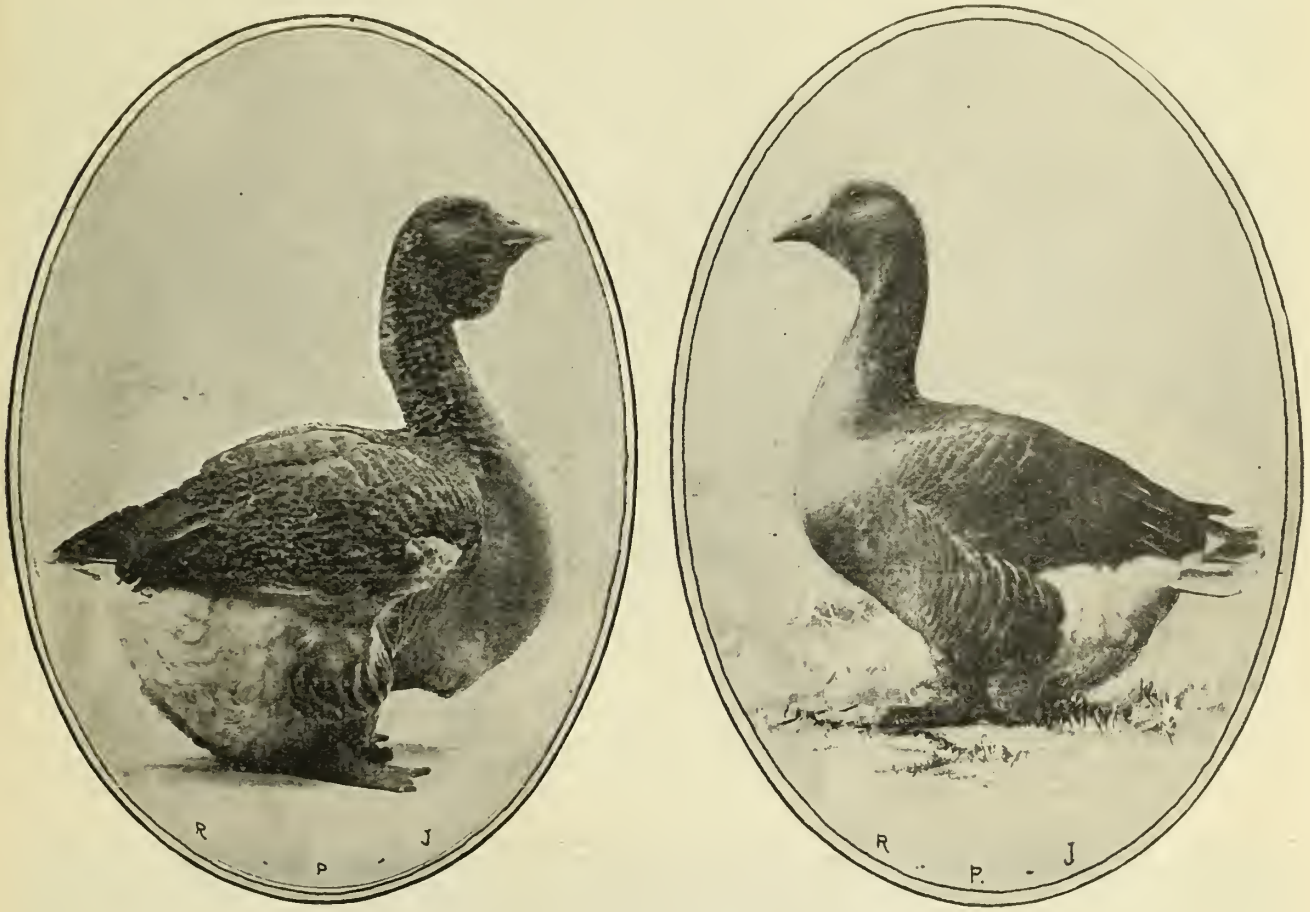


WING OF TOULOUSE GOOSE

While most of the domestic geese in America are of Old World stock the large wild goose which ranges North America, but breeds mostly in Canada and is called the Canadian Goose, has been widely bred in captivity, and in some localities the common stock is much mixed with this wild blood. Along the New England coast wild Canadian Geese are bred in captivity by a great many persons who sell them to hunters to use as decoys, and are also much used to cross with the common domestic geese to produce what is called the Rhode Island mongrel goose. It has been generally held that these mongrels are hybrids, incapable of breeding together or with either parent stock. The writer has been repeatedly told by those who bred both wild geese and mongrels that this is the case. But in 1913 he had some geese hatched from eggs bought for Toulouse which developed remarkable powers of flight, and in other ways showed an apparent mixture with wild blood. Upon investigation he found that several years before the owner of the flock from which the eggs came had used a gander of the color of the Toulouse but rather small which he had found it necessary to pinion to keep from flying so far that recovering it made a great deal of trouble. Again in 1918 a lot of eggs bought for Toulouse produced goslings that plainly showed an admixture of wild blood in proportion that could only result from fertile birds of part wild blood. Observation of geese as seen in the stocks fattened in New England, coming largely from Canada, had before made him skeptical as to the correctness of the theory that the so-called hybrids are infertile. The breeding habits of geese are such that where only a few are kept —as is commonly the case— there frequently is difficulty in getting even the thoroughly domestic birds to mate as desired. Also opinion upon such points in a great many cases is not based on experience at all, but on tradition of unknown authority. A similar case is the opinion common among goose breeders that the eggs of young geese are not fertile the first season. The writer has set eggs both from pairs of young geese, and from matings of young geese and old ganders, and found the eggs fertile and the goslings exceptionally vigorous. He has never been so situated that he could by practical demonstration show conclusively the fertility of the cross of the Canadian Goose with domestic races, but the circumstantial evidence in the case

seems to him to indicate plainly that though there may be obstacles to getting the birds to breed at first, they are not sterile, and that all the stocks of the three origins indicated above breed together.

The so-called African Goose is known not to come from Africa, and is generally regarded by early poultry writers as of Asiatic origin — an enlarged type of the Brown Chinese Goose. While that is possibly the case, the appearance of the birds and an examination of references to them in early poultry and agricultural literature supports the theory that "African" Geese were produced in America as a result of crossing Brown Chinese on any large gray geese. Many of the geese called African



EXHIBITION TOULOUSE, GANDER AND GOOSE

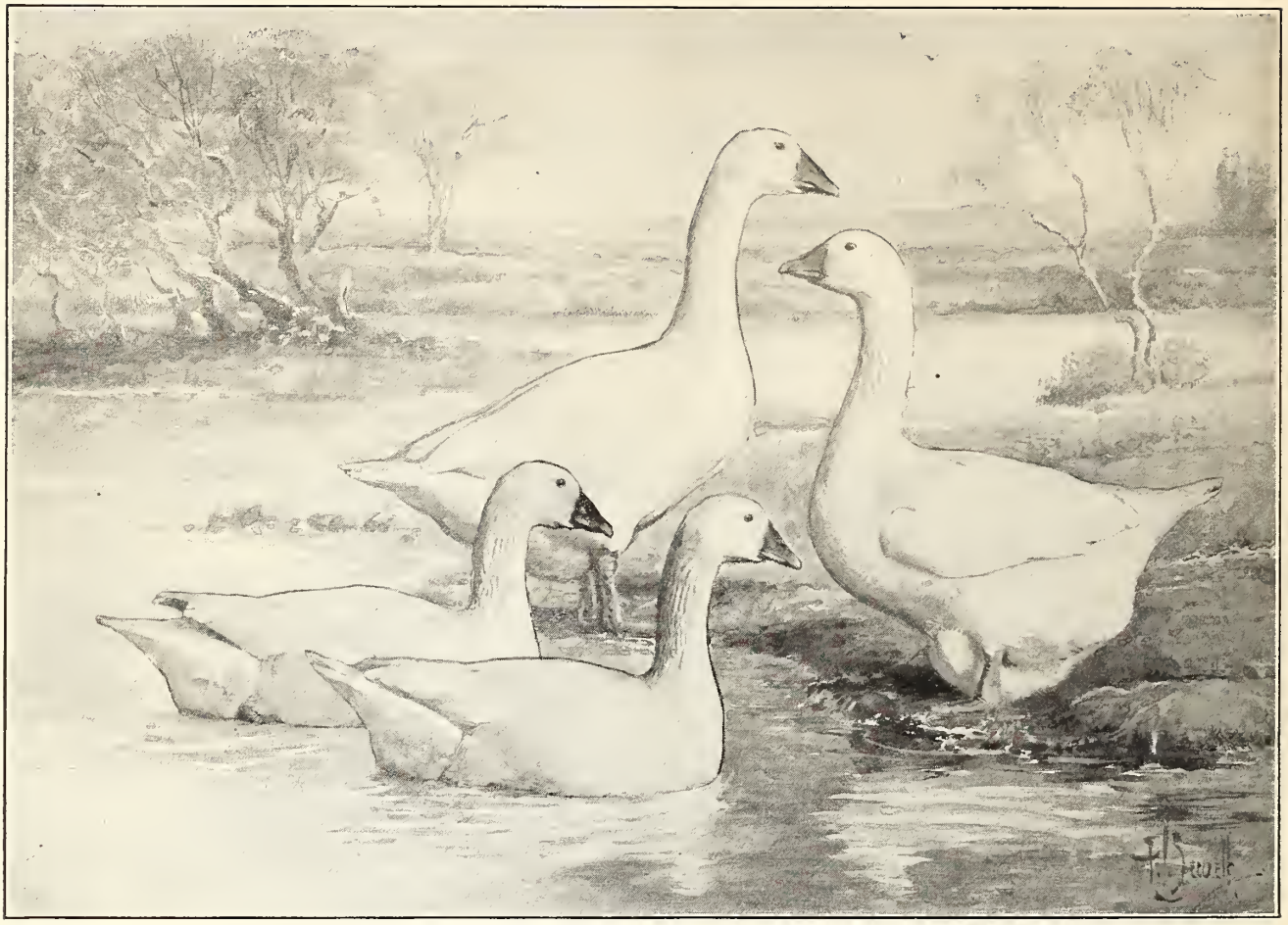
are plainly grades or crosses with a large proportion of the Brown Chinese blood.

In the types of domestic geese the same general differences noted in ducks may be observed. With the exception of the Chinese which are kept also for their oddity and ornamental characters, geese are bred either for the table or to furnish stock for the improvement of common flocks. Of improved breeds of European origin there are only two. The Toulouse, the largest breed of geese, originated in the south of France as a local improved breed. The Emden, a somewhat smaller breed, appears to have been derived perhaps about equally from improved German stock and the large specimens of the same color in English stocks. Though the Toulouse Goose appears to have been more highly developed in France than the Emden was in Germany, both owe their present size and type to the efforts of English breeders. Both are meaty and massive. The Standard specifies 26 pounds as the weight of the adult Toulouse gander against 20 pounds for the Emden, but in old goose and young gander the difference in weight between these breeds is only 2 pounds, and the young geese are given the same weights. Toulouse Geese as they run are a little larger than Emdens, but the difference is neither considerable nor regular. Many Emdens are as large as the largest Toulouse, and the average Toulouse seen in exhibitions is not above standard weights for Emdens. The very large and heavy specimens in both breeds are apt to be coarse, logy and so ready to fatten that they are indifferent layers and breeders; but frequently big birds are found that are fine boned, strong, vigorous and excellent layers and breeders.

The Chinese Geese economically bear much the same relation to the heavy Toulouse and Emden that the Indian Runner does to the heavy breeds of ducks. They have the more upright carriage of the body and the greater activity of the Runner, and with these greater prolificacy. The African Goose is an intermediate type.

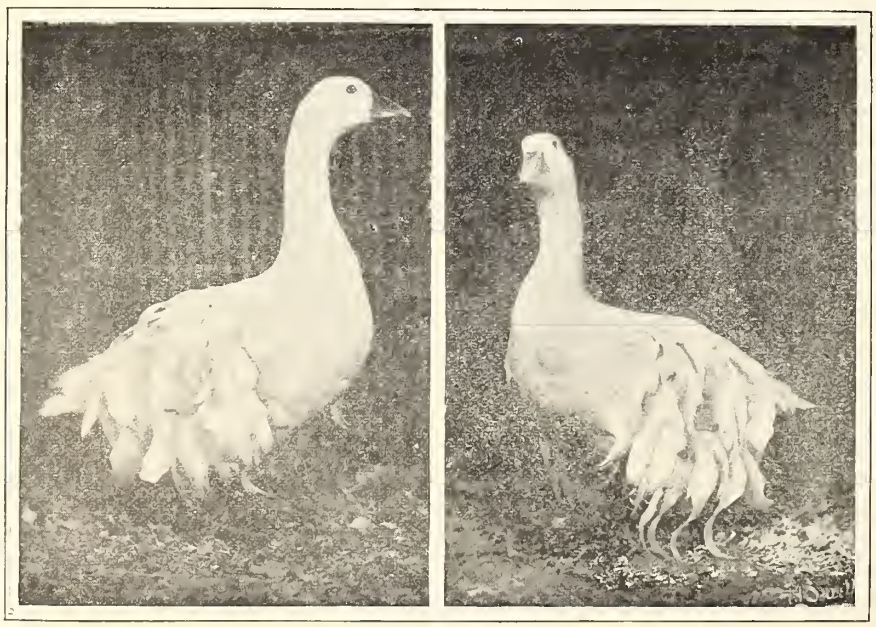
The color of the Gray Lag Goose is thus described in Meall and Horner's edition of Moubray's "Domestic Poultry": "The general plumage is of a dark ashy-gray shade: the feathers on the head, neck and back being of a grayish brown, margined generally with lighter gray edges; those of the wings and coverts shaded with light and dark leaden-gray; tail coverts and rump very light gray or white; belly and under and hinder parts white; bill, legs and feet of a dull pinky-flesh color."

Except that he may not have noted any brown in the plumage, or brownish cast to the gray in some sections, anyone familiar with the coloring of gray domestic geese will see that this color description would apply to a great many of them. Brown in gray geese may come from a



STANDARD EMDEN GEESE

Brown China mixture, but the fact that there is brown in the wild Gray Lag Goose explains its presence in geese supposed to be of purely European origin, and makes it unnecessary to consider specimens which do not show in marked degree other traces of mixture, as probably of mixed blood. It is interesting to note in this connection that though we know neither brown geese of Western European origin nor Eastern Asiatic gray geese, there is in Russia, as described by Brown, in his "Races of Domestic Poultry", a race of geese which has as more or less well-established color varieties, gray, white and "clay-colored" stocks. These birds have a knobbed bill somewhat like that of the Chinese and African Geese, a fact which also suggests the influence of the Brown Chinese. But though little is known in England and America of the history of this Russian breed of geese, the most authoritative opinion is that the race is an ancient one established in type centuries ago. Hence, resemblance to Chinese Geese is more likely to be due to common origin, or to the influence of the Chinese type through Russian contact with Tartar and Mongolian peoples in the past.



SEBASTOPOL GEESE

If the Chinese races of geese, as known to us, were originally from the Gray Lag Goose, the color of the brown variety is due to the selection for and intensification of the red in the plumage. If the Chinese Geese are of another origin, it is natural to suppose that they came from a wild race in which red pigment was more abundant than in the Gray Lag Goose. The wild Canadian Goose though

FLOCK OF WHITE CHINA GEESE

predominantly gray in color is much more strongly pigmented than the description shows the Gray Lag Goose to be. Its head and neck are black. It has a dark gray back—sometimes with a brownish tinge—and has more or less brown in very dark gray wings. The breast is a light gray, becoming darker as it approaches the legs. The underpart of the body from the legs back is white or nearly white. Canadian Geese are classed and described as a standard breed and are frequently seen in competition at poultry shows. In the standard specifications red or brown is admissible only in the wings, but as described by naturalists (who simply describe the birds as they find them, not assuming to give one type preference over another), brown is mentioned as the prevailing color on back and wings.

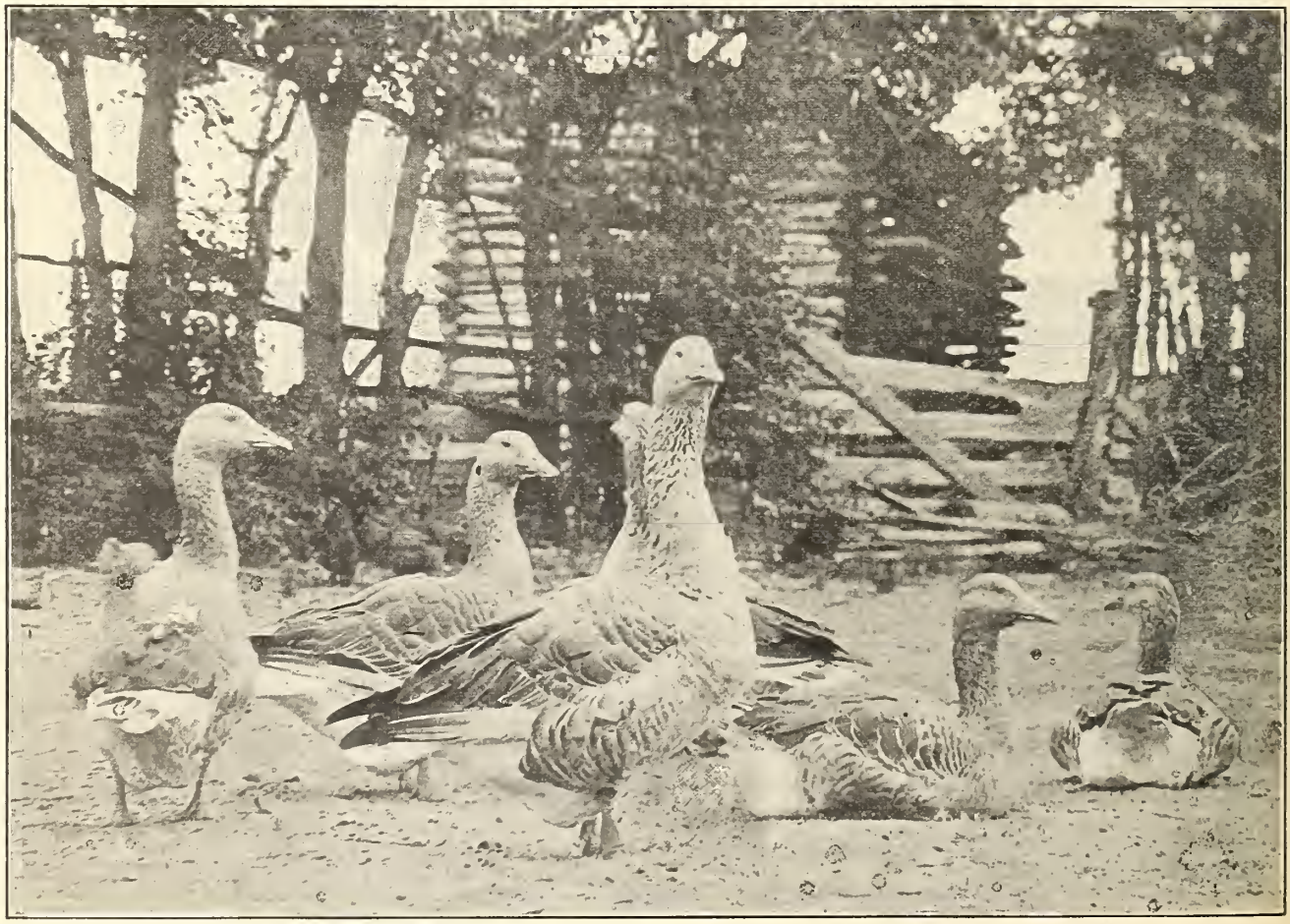
The color of the gander and goose is the same in the wild races and also in most domestic breeds. Brown in describing the Pomeranian or Saddleback Geese of Germany says that the geese are generally pure white in color while the ganders have gray heads, necks, backs and wings. It should, however, be observed that Brown also says of the breed that it is regarded as a cross, and de-

FLOCK OF AFRICAN GEESE

scribes the characters only as "more or less fixed." This showing hardly warrants the assumption that a difference in sex coloration is actually established. Color in geese, as in ducks, seems to have at least as much tendency to appear in large irregular spots or patches as toward taking the form of definite markings distributed through the plumage of one or more sections. The development of color patterns has been limited to white and such modifications of gray and brown as would be made with attention to securing an ordinary uniformity in the natural markings. The influence of the wild Canadian Goose on the color of domestic geese is an accidental one limited generally to the crossbred progeny, but possibly accounting for the very dark color in some of the supposed Toulouse Geese that have shown other indications of a mixture of wild blood.

From the viewpoint of adaptability to conditions of life and to special market requirements the development of types and breeds of geese must be regarded as in an intermediate state. The greater part of the geese produced in America are grades made on a basis of old common mongrel stock, often of very poor quality, by rather random crossing with improved stock. There are here and there throughout the country some fine farm flocks of Toulouse and Emden Geese—particularly of the Toulouse—but these are for the most part breeders' flocks, not sold for the table at maturity, but used to improve inferior flocks. The apparent reason for the persistence of crossbreeding and grade breeding in geese when other kinds of poultry are more on a basis of breeding to established types, and at least roughly to definite standards, is to be found in the fact that none of the recognized breeds of geese satisfactorily meets general requirements. The Toulouse and Emden of standard weight, or near it, are too large for the ordinary market demand, and the African, while smaller, is still above the size most in demand, and also is objectionable to many people because of its noisiness. The Chinese Geese are rather small, and are generally noisy. The popular ideal goose in America would be a breed in which the adult males weighed 15 or 16 pounds and the females 12 to 14 or 15 pounds. These weights are common in undersized Toulouse, Emdens and Africans; but stock of that class does not in any way compare favorably with the produce of crosses which have on one or both sides normally well-developed birds.

Breeders of geese for market are likely to continue to make crosses for that purpose until a pure breed that suits them is developed. Suitable stock can be made from both Toulouse and Emdens by selection for birds that have the type in an intermediate weight. What is desired is full meat development with just the right bone to carry it well. The proper way to get more popular breeds of geese is to make them, as the general-purpose breeds of fowls were made. This is a field open to every grower of geese for the table. It is practically an unworked field as far as color developments are concerned. Comparatively little attention has been given to the development of the possible color patterns in geese, yet no one can doubt that the colors of geese are susceptible of a great deal of manipulation. And while color is of little importance from a market standpoint, it is of much importance in stimulating the work of making new breeds.



FLOCK OF ORDINARY FARM-BRED TOULOUSE GEESE

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